

# ENVIRONMENTAL ASSESSMENT BOARD



## ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

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VOLUME: 143

DATE: Wednesday, May 6, 1992

BEFORE:

HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

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ENVIRONMENTAL ASSESSMENT BOARD  
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act,  
R.S.O. 1980, c. 140, as amended, and Regulations  
thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro  
consisting of a program in respect of activities  
associated with meeting future electricity  
requirements in Ontario.

Held on the 5th Floor, 2200  
Yonge Street, Toronto, Ontario,  
Wednesday, the 6th day of May,  
1992, commencing at 10:00 a.m.

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VOLUME 143  
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B E F O R E :

THE HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

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1 ---Upon commencing at 10:03 a.m.

2 THE REGISTRAR: Please come to order.

3 This hearing is now in session. Please be seated.

4 THE CHAIRMAN: I would like to put on  
5 record Exhibit 647A, which is a supplementary to  
6 Exhibit 647, both filed by the Independent Power  
7 Producers' Society of Ontario. The exhibit contains  
8 the data used to plot the world nuclear performance,  
9 1989 graph, on page 16 of Exhibit 647.

10 ---EXHIBIT NO. 647A: A supplementary to Exhibit 647,  
11 filed by the Independent Power  
Producers' Society of Ontario.

12 THE CHAIRMAN: Mr. Campbell?

13 MR. M. CAMPBELL: Thanks, sir.

14 DAVID WHILLANS,  
15 KURT JOHANSEN,  
16 FRANK CALVIN KING,  
WILLIAM JOHN PENN,  
IAN NICHOL DALY; Resumed.

17 CROSS-EXAMINATION BY MR. M. CAMPBELL (Cont'd):

18 Q. Towards the end of the afternoon  
19 yesterday I put questions to Dr. Whillans respecting  
20 the dose and dose rate issue, and I gather that he has  
21 had a chance to look at that in a little more detail.

22 Perhaps, Dr. Whillans, if you could  
23 complete your thoughts on that issue, please.

24 DR. WHILLANS: A. Well, I think that the  
25 controversy was whether or not a value of 2 or 4 had

1       been applied.

2                   Q.   That's correct, yes.

3                   A.   And I thought just to clarify what I  
4       believe is the situation. I would refer you to what is  
5       the ICRP's position, it's contained in their 1990  
6       recommendations in publication 60. I wasn't going to  
7       read a lot of it, but I was going to refer you  
8       particularly to paragraph 74 on page 18, where they  
9       clearly say that they chose a value of DDREF equal to  
10      2, and then in a fairly detailed appendix which  
11      supports their recommendations, first in paragraph B57,  
12      and I will read all small excerpt here:

13                   Note: Various terms have been used to  
14                   describe the ratio called DREF by the  
15                   NCRP. The Commission has decided to call  
16                   this important ratio the dose and dose  
17                   rate effectiveness factor, DDREF.

18                   So we are talking about the same thing.  
19       As I explained yesterday, it can take into account both  
20       dose and dose rate changes.

21                   Finally, from pages 108 to 112 of this of  
22       this publication is a detailed explanation of all the  
23       evidence that they have considered. I will quote their  
24       summary line on page 11, the last line:

25                   In view of these considerations, and



1 especially that limited human information  
2 suggests a DDREF in the low dose region  
3 of the range - and they had said  
4 previously the range was 2 to 10 -  
5 the Commission has decided to recommend  
6 that for radiation protection purposes  
7 the value 2 be used for DDREF,  
8 recognizing the choice is somewhat  
9 arbitrary and may be conservative.  
10 Obviously this recommendation can be  
11 expected to change if new, more  
12 definitive becomes available in the  
13 future.

14 So that is the current position of ICRP  
15 and that's what we use as well.

16 Q. That's the ICRP position.

17 A. Yes.

18 Q. But that's quite different from the  
19 position that is applied in the Preston statement and  
20 the article by --

21 A. No, I don't think the Preston/Pierce  
22 paper has anything to do with DDREF.

23 What it is, the title is, The Effective  
24 Changes in Dosimetry on Cancer Mortality Risk Estimates  
25 in the Atomic Bomb Survivors.

1                   In my reading of it, basically what they  
2                   are doing is reviewing the effect of the new dosimetry  
3                   called DS86, compared with the previous dosimetry on  
4                   the estimates that would be derived. But this is all  
5                   applied to the estimates that would be derived from the  
6                   Japanese survivors who were acutely irradiated. So  
7                   dose rate effectiveness factor I don't think comes into  
8                   this article.

9                   Q. Well, in the table which I read at  
10                  page 35, if I read it correctly, they discussed the  
11                  linear extrapolation which gave you a rate of, I think,  
12                  16.9 at the low dose range. I will just refer to that.  
13                  It's Exhibit 661, on page 35. 16.7, so we could call  
14                  that 17, if you wish.

15                  In the next column, this is divided in  
16                  two, for the low dose extrapolation. And then in the  
17                  reference in the other article, Exhibit 658, page 26,  
18                  divides that again.

19                  A. Well, the problem I have with this  
20                  table is that it says a range suggested by use of  
21                  UNSCEAR factors for low dose extrapolation, and it  
22                  doesn't give a reference. As I said yesterday, we know  
23                  it wasn't the UNSCEAR 1988 document because this was a  
24                  previous publication. And I don't know where to find  
25                  this range.

1                   The range that is described in detail in  
2           those pages of the ICRP publication, that I referred  
3           to, includes the numbers by UNSCEAR, and I don't see  
4           these numbers in that range -- I'm sorry, in those  
5           pages, and the number generally is a factor of 2 to 10.  
6           As I said, ICRP believes that the evidence doesn't  
7           support using a number greater than to 2.

8                   So I guess I can't help you because I  
9           don't know where numbers such as 5.6 to 11.1 are  
10          referred to in UNSCEAR.

11                   Q. We will perhaps have to address that  
12          later on in our case and try to respond.

13                   A. Sure. But the situation is that the  
14          ICRP and in Ontario Hydro's risk estimates, it applies  
15          a factor of 2 to the solid cancer data and doesn't make  
16          any reduction for the leukaemia risk.

17                   Q. Have the extracts which you read been  
18          produced as an exhibit by any chance?

19                   MS. HARVIE: No, they haven't and that  
20          raises as good point, Mr. Campbell.

21                   May I suggest, Mr. Chairman, that we  
22          obtain additional copies of ICRP 60 from wherever it's  
23          published and file it as an exhibit on the record.

24                   MR. M. CAMPBELL: I won't have any  
25          reference to it today, as far as I am concerned.

1 THE CHAIRMAN: It's been referred to  
2 several times.

3 MS. HARVIE: It has. It was even  
4 referred to in our evidence in chief, and given the  
5 prominence that has been given to it, I think it should  
6 be filed. Perhaps we could get an exhibit number for  
7 it now.

8 THE CHAIRMAN: Could we have an exhibit  
9 number?

10 THE REGISTRAR: 667.

11 MS. HARVIE: Thank you.

12 THE CHAIRMAN: Thank you, Ms. Harvie.

13 ---EXHIBIT NO. 667: ICRP 60 Report.

14 DR. CONNELL: Dr. Whillans, the case for  
15 the DDREF factors is based on irradiation of animals  
16 under experimental conditions; is that correct?

17 DR. WHILLANS: That is the main positive  
18 evidence.

19 As I said, I think yesterday, and it is  
20 described in these pages, there are some limited human  
21 comparisons with the acute high dose exposures in Japan  
22 compared with, for example, some diagnostic or  
23 therapeutic exposures in medical treatments.

24 The data is not really very convincing  
25 one way or another. For some sites it appears that the

1 response is almost the same at the low dose, dose rate,  
2 as it was in Japan. This was the case for breast  
3 cancer, for example. For other organs it appears that  
4 the response is lower, this is other human evidence,  
5 the response is lower for low dose rates, but it's  
6 fragmentary evidence and it is not really heavily  
7 relied upon.

8 DR. CONNELL: I would like to focus on  
9 the animal experiments for a moment. Can you tell me  
10 what species have been used in these experiments?

11 DR. WHILLANS: Most of these studies  
12 would be rodents, mainly mice.

13 DR. CONNELL: Have differences among  
14 species been observed?

15 DR. WHILLANS: I would have to refer to  
16 the NCRP document to give you a precise document, or  
17 this is also reviewed in the BEIR 5 document that we  
18 had made reference to.

19 When I say most of it is mouse work,  
20 essentially all of it is mouse work. There may be a  
21 few examples in rats, for example.

22 So I don't think it is possible to say  
23 whether there is a large difference in those species.

24 DR. CONNELL: Right. Has the mouse work  
25 been done with whole body irradiation or has there been

1 some targeted...

2 DR. WHILLANS: Mainly it would be whole  
3 body exposures. Most of these studies were done at Oak  
4 Ridge. There may be some isolated exposures of  
5 specific organs such as the thyroid where you can give  
6 an iodine, radioactive iodine exposure which  
7 predominantly exposes one organ. But that wouldn't be  
8 the general case.

9 [10:13 a.m.]

10 It would be difficult to expose single  
11 organs, other single organs of a mouse, and it would  
12 also be difficult to know how to interpret them because  
13 a mouse is not like humans in every way.

14 DR. CONNELL: Right.

15 DR. WHILLANS: So I think I'm saying that  
16 I doubt if many of those kinds of studies have been  
17 done.

18 DR. CONNELL: Right. And I would assume  
19 that in the experiments on mice there have been a  
20 variety of conditions used and a variety of strains of  
21 mice, so you would probably find amongst scientists who  
22 have tried to estimate values of DDREF that might be  
23 applicable to mice, you would see quite a range; would  
24 you, from one report to another?

25 DR. WHILLANS: I think that it's unlikely



1       that the exact experiment, experimental conditions,  
2       have been repeated very often by different authors, for  
3       example, because these would be probably large numbers  
4       of animals in each study and I would think that there  
5       would be a range of similar experiments but probably  
6       not ones that you could directly say contradict  
7       another.

8                       DR. CONNELL:  You would find --

9                       DR. WHILLANS:  It's sensitive.

10                      DR. CONNELL:  But you could find  
11       validation for DDREFs as low as one or even lower than  
12       one and perhaps higher than 10?

13                      DR. WHILLANS:  Within just animal  
14       studies?

15                      DR. CONNELL:  Yes.

16                      DR. WHILLANS:  Well, I will just refer  
17       to -- this one has already been filed so you don't need  
18       to worry.

19                      The BEIR 5 report gives an analysis of  
20       this, particularly from the point of view of trying to  
21       estimate what value might be applied to humans, and if  
22       I can just look for a moment at the table here.  Well,  
23       just to give you some numbers.

24                      This is a summary table of dose rate  
25       effectiveness factors.  Now, we talked about dose and

1 dose rate. These are specifically dose rate  
2 effectiveness factors.

3 From laboratory animal studies, for  
4 example, when the end point is a specific locust  
5 mutation the observed full range of values is 3 to 10,  
6 and what they call a narrow range of values, which is  
7 picking out the ones that they believe probably are  
8 methodologically incorrect or have limitations in the  
9 opinion of this committee, 3 to 7. Single best  
10 estimate in that case was 5. Life-shortening observed  
11 full range is 3 to 10, limited narrow range 3 to 5,  
12 best estimate is 4. Tumourogenesis, 2 to 10, narrow  
13 range 2 to 5, best estimate is 4.

14 So this is the kind of data that is also  
15 reviewed in the NCRP publication. For different end  
16 points different studies find different values and when  
17 you look at the whole range of end points and values  
18 numbers within the range 2 to 10 can be supported, a  
19 central estimate would be something like 3 or 4, but  
20 given the fact that there are some human comparisons  
21 that can be made which tend to show values in the lower  
22 range as ICRP says, ICRP has chosen a factor of 2.

23 I guess the only real concern is whether  
24 the factor should be 1. I don't think there is a  
25 suggestion usually that it should be less than 1. And

1 what ICRP says, and BEIR as well, is that for some  
2 particular studies, particular sites, the best value  
3 may be 1, but in general a value of 2 is more  
4 representative and, in those cases, 2 is included  
5 within the uncertainty as well.

6 DR. CONNELL: All right. I take it there  
7 are no relevant data from other primate species?

8 DR. WHILLANS: I don't know of any. I  
9 could be wrong, but there may be a single isolated  
10 study in monkeys, for example, but I'm not aware of it  
11 and it certainly isn't mentioned as something that is  
12 distinctly different from the other animal data.

13 DR. CONNELL: Thank you.

14 DR. WHILLANS: These studies tend to  
15 involve large numbers of animals because at low doses  
16 and dose rates and with an induction rate of only 5 per  
17 cent per sievert, you know, only a very small  
18 proportion of the studied animals are going to develop  
19 the end points so you have to have very many in order  
20 to get a statistically representative group.

21 And so because they involve a large  
22 number of animals there are the usual questions about  
23 whether it's ethical or worthwhile to study that number  
24 and also the costs, and this becomes much more  
25 important for a larger mammal than a mouse.

1 MR. M. CAMPBELL: Can we get the page  
2 reference and exhibit number onto the record. I don't  
3 know whether --

4 DR. WHILLANS: The BEIR 5 report is  
5 Exhibit 623 and the table I was referring to was table  
6 1-4 on page 23.

7 MR. M. CAMPBELL: Thank you.

8 Q. I wonder if we could move on to --

9 DR. WHILLANS: A. Mr. Campbell, before  
10 we move on, can I correct an impression I may have left  
11 with you yesterday. In rereading our discussion  
12 yesterday I looked at the part where we were discussing  
13 table 1.1 of our Exhibit 507.

14 Q. Yes.

15 A. And you were asking specifically  
16 whether the category nuclear power generation - I  
17 better get the correct title. This is the table of  
18 typical sources of radioactivity in the environment and  
19 one of the categories was called occupational nuclear  
20 power, and we said that the average dose to a member of  
21 the public was less than .01 millisieverts per year,  
22 and we had a discussion about whether that included  
23 workers, and I believe what I told you is still  
24 correct.

25 We had this discussion previously with

1 one of the other intervenors and the question of  
2 workers came up and I just wanted to repeat what we had  
3 said at that time, was that even if you included  
4 radiation workers which, in our facility, number about  
5 5,000 and have an average dose of about 2  
6 millisieverts, you include that exposure even it would  
7 not have changed these estimates, because when it's  
8 essentially diluted amongst the population of Ontario,  
9 say, of about 10 million it would not have changed  
10 this.

11 So I'm not really making a correction,  
12 I'm just adding some information that we had that we  
13 discussed earlier.

14 Q. I understood you in that sense. So I  
15 don't think I have a problem with that.

16 A. Okay.

17 Q. Thank you for that direction. Any  
18 other matters?

19 A. That's it.

20 Q. Ready to go. Could you turn, please,  
21 to Exhibit 510.150 this is interrogatory response to  
22 9.2.9 together with a couple of other additional  
23 attachments which we have supplied.

24 THE CHAIRMAN: Did you hand those up  
25 yesterday?

1 MR. M. CAMPBELL: They should be in the  
2 materials.

3 THE REGISTRAR: Yes, they are.

4 THE CHAIRMAN: What number is it?

5 MR. M. CAMPBELL: 150.

6 THE CHAIRMAN: I have got it.

7 DR. WHILLANS: This is 9.2.9?

8 MR. M. CAMPBELL: Q. Interrogatory No.  
9 9.2.9.

10 DR. WHILLANS: A. Yes.

11 MS. HARVIE: I'm not sure if we made  
12 copies for the Board, but it has been attached perhaps  
13 in error to Exhibit 653.

14 MR. M. CAMPBELL: Oh, it was not attached  
15 in error to the copies which the Board received, we  
16 corrected that, but I don't know that it was corrected  
17 for your group.

18 THE CHAIRMAN: I have it separately.

19 MR. M. CAMPBELL: Yes, it should be  
20 separate.

21 MS. HARVIE: Okay.

22 MR. M. CAMPBELL: Q. I take it you are  
23 familiar with this correspondence, Dr. Whillans, this  
24 is some of your work, I take it?

25 DR. WHILLANS: A. Yes, yes.



1 Q. And I turn to the first memorandum  
2 which I gather was prepared by you and directed to Mr.  
3 R.T. Popple; is that correct --

4 A. That's correct. He's the director of  
5 the health and safety division.

6 Q. You were responding to concerns that  
7 workers might have respecting the Sellafeld study; is  
8 that correct?

9 A. I guess that is generally right. As  
10 you can see from the date of the memo which is February  
11 26th, 1990, and on the first line it refers to a paper  
12 that was published in the British Medical Journal on  
13 February 17th, 1990. It was really a memorandum to  
14 advise him of what I felt the implications of this  
15 paper were.

16 Q. Very well. Could we turn to the  
17 second page of that memorandum, the bottom third where  
18 you discuss some of the statements that Gardner has  
19 made. The very last sentence in that paragraph reads:

20 Present estimates for these forms of  
21 cancer alone appears to be about  
22 four-fold greater.

23 Would you elaborate on that sentence,  
24 please? Four-fold greater than what?

25 A. I'm just rereading the previous

1 lines.

2 All right. Well, as I think we have  
3 discussed, and perhaps it was another intervenor, the  
4 ICRP both in 1977 and in 1960 included in their  
5 estimates of risk of stochastic damage from radiation  
6 exposure a value for genetic or hereditary defects.

7 These are risks to the succeeding  
8 population from irradiation of one or more of the  
9 parents.

10 Q. Does that include birth defects or  
11 other forms of damage?

12 A. Well, typically UNSCEAR and ICRP talk  
13 about genetic effects, and I am not sure that all  
14 hereditary effects have to be genetic, it's probable  
15 that they are, but it's possible that there could be  
16 some other sort of mechanism.

17 For example, in this particular case  
18 where what was found was that the children of workers  
19 at the Sellafield plant who had certain  
20 characteristics, one of which was they had been exposed  
21 to radiation, these children had a higher risk of  
22 developing leukemia, childhood leukemia.

23 [10:25 a.m.]

24 And in that case it is possible that the  
25 mechanism is somehow the carryover of radioactivity in

1 the bodies of the workers into the fetus. That's a  
2 possibility. I think it's probably unlikely.

3 But I am making the distinction that it  
4 is not necessarily true that hereditary means genetic  
5 but we are taking it to mean that here.

6 Q. Does your last sentence mean that the  
7 estimates for these forms of cancer alone appeared to  
8 be about fourfold greater? Does that mean that ICRP is  
9 off or does it mean that Gardner has found a  
10 correlation which is a four times greater than that  
11 which would be predicted by ICRP? Can you tell me what  
12 that sentence means?

13 A. Yes, I think it's closer to the  
14 latter.

15 I should emphasize that what Gartner did  
16 was follow on an observation that there seemed to be  
17 significant excessive cancer, childhood cancer, in a  
18 village located near the Sellafield facility. What he  
19 did was a case control study of these leukaemia cases  
20 and identified a number of risk factors that seemed to  
21 be statistically in excess. And there are limitations  
22 to the interpretation of that kind of study. We have  
23 talked about those with previous intervenors as well.

24 Although it's statistically highly  
25 significant, the excess in the village, whether it is

1 due to one our all of the risk factors that seem to be  
2 in excess in study is still a question which has to be  
3 interpreted as to whether similar results are found in  
4 other studies, whether they are mechanisms that can  
5 explain it, whether there are other compounding factors  
6 and so forth.

7 So I am saying that we take the Gardner  
8 result as being something that we should certainly be  
9 aware of and follow up in some of these ways. But it  
10 doesn't necessarily mean that ICRP estimates are wrong.  
11 I would point out that, for example, there were  
12 something like 30,000 children born of parents who were  
13 exposed in Nagasaki and Hiroshima who received average  
14 doses, the parents did, of about .4 sieverts each, and  
15 there is not an excess of hereditary diseases in that  
16 population. So we have contradiction immediately.

17 Now, there are differences between the  
18 populations. But I guess I am saying that just because  
19 one study has found something that seems to be at odds  
20 with the ICRP's recommendation, it's something that we  
21 should note, but it doesn't mean we change the  
22 recommendation.

23 Q. Well, your concluding paragraph, page  
24 3 of the memorandum said:

25 It would appear reasonable to support

1 the AECB in extending their study.

2 So I take it that you were sufficiently  
3 concerned that you wanted to have further studies of  
4 this.

5 A. The first part of that paragraph  
6 refers to efforts that are under way to replicate the  
7 Sellafield, the Gardner result in other situations, and  
8 one of those efforts was in Canada where the AECB had  
9 sponsored a study to look into the leukaemia rates that  
10 are found around nuclear power plants in Ontario.

11 And so this simply says that I think when  
12 you find such a result, it is important to look for  
13 ways to either understand it or dismiss it, if that's  
14 what happens, but you certainly shouldn't ignore it.

15 Q. Also in this bundle of documents we  
16 have correspondence, the next document which appears to  
17 be to Dr. Harold Stocker. I don't want to refer to  
18 that, nor do I want to refer to the response by Dr.  
19 Stocker to Mr. Popple.

20 I want to move over to the memorandum  
21 dated December 5th to Mr. G. Armitage again signed by  
22 you.

23 A. But those documents you don't want to  
24 refer to are basically the actions of Ontario Hydro in  
25 supporting extending studies.

1                   Q. Absolutely. I am not wishing to  
2 minimize that. I am saying for my purposes this  
3 morning I don't really need to refer to the fact that  
4 further studies were concerned.

5                   Now, in your December 5th memorandum, in  
6 the second paragraph you say:

7                   In brief - in the middle of that  
8 paragraph - I find no scientific evidence  
9 to justify special discriminatory  
10 restrictions on radiation exposure of a  
11 mother prior to conception or up to the  
12 point at which pregnancy is recognized,  
13 provided this recognition occurs within  
14 eight weeks of conception.

15                  Now, at the time that you wrote this  
16 memorandum had you received the results of the studies  
17 from the AECB?

18                  That is a question, sorry.

19                  A. Had we received of the results of the  
20 studies that AECB--

21                  Q. Was contemplating?

22                  A. --carried out.

23                  Well, the final report of the AECB study  
24 of childhood leukaemia was published only last year so  
25 we had not received those.



1 Q. So in the face of uncertainty over  
2 this you took the position that the burden of proof had  
3 not been met, and that in the absence of scientific  
4 evidence one could proceed more or less as usual.

5 A. I think we are being a little  
6 careless here, because the Sellafield study looked at  
7 fathers. What this sentence is talking about is  
8 mothers. It's the context of other kinds of  
9 exposure -- other kinds of risks other than the risk  
10 that Gardner may have uncovered.

11 Q. Let me ask you about this issue.  
12 Because attached to the memorandum of December 5th is  
13 also a document which doesn't appear to be signed by  
14 anyone. It's a 10-page document entitled: A Review of  
15 the Risk Resulting from the Radiation of Exposure of  
16 Workers Prior to the Birth of Their Offspring.

17 Is this, as well, prepared by Ontario  
18 Hydro?

19 A. Well, just prior to the sentence you  
20 read, it says the attached report summarizes the  
21 findings of my review of these risks and contains  
22 recommendations on these issues, and this is the  
23 attachment.

24 Q. Could we look at the recommendation  
25 on page 9, No. 1?

1 A. Yes, I have it.

2 Q. Could you comment on that  
3 recommendation and on your statement in the second  
4 paragraph of your covering memo?

5 A. Well, the whole issue of whether or  
6 not --

7 Q. Well, is there a difference between  
8 the recommendation and your--

9 A. I would say no.

10 Q. --summary?

11 A. Yes.

12 Q. The bottom paragraph of your December  
13 5th memo:

14 With respect to the risks associated  
15 with paternal exposure, I believe it's  
16 premature to formulate any change in  
17 radiation protection practices.

18 A. Yes.

19 Q. To my mind, when pregnancy is likely  
20 there should be no further planned  
21 exposure of the worker.

22 Is there any contradiction there, Dr.

23 Whillans?

24 A. You are skipping back to page 9.

25 Q. Yes. I am contrasting the

1 recommendations in this paper with your memoranda to  
2 Mr. Armitage.

3 A. Again, perhaps it's only in my mind,  
4 but I think we are confusing different situations.

5 Now certainly I would stand by my  
6 statement that with respect to the risks associated  
7 with paternal exposure, I believe it's premature to  
8 formulate any change in radiation protection practices,  
9 that is because I believe that there is no consensus  
10 that the result at Sellafield necessarily resulted from  
11 paternal exposure.

12 There are other studies where -- I  
13 mentioned the Japanese experience, but certainly other  
14 studies as well where that has not been found, and  
15 there is some serious question about whether other  
16 confounding factors may have been responsible. That  
17 takes care of paternal exposure.

18 The main concern over the years has been  
19 the question of protection of potentially pregnant  
20 female workers as radiation workers, and there are a  
21 number of mechanisms that we are concerned about apart  
22 from this Gardner finding.

23 What this 9-page attachment attempts to  
24 do is to go through these various other effects, and I  
25 have listed them there, we may not have to go through

1       them, and decide whether or not that justifies some  
2       increased protection of female workers.

3               This has been a subject of controversy  
4       for a long time. Prior to I think about 1986 Ontario  
5       Hydro had a policy of not allowing potentially pregnant  
6       workers to be radiation workers, and this was  
7       overturned I think in the courts because it's a  
8       discriminatory practice which was found not to have a  
9       reasonable basis.

10              Q. Was your recommendation based on the  
11       legal aspects of it or was it based on the --

12              A. No, my recommendation is based on the  
13       fact that I believe during the period in which a worker  
14       might unknowingly be pregnant, the risk is not high  
15       enough to justify any special protection practices.

16              Q. Well, the 10-page review listed a  
17       number of references. We also did a bit of a search  
18       and found a number of other papers dealing with  
19       childhood leukaemia, and the document which I believe  
20       is attached to the exhibit, the last document, is such  
21       a study, where an association between -- I think the  
22       abstract, first four or five lines of the abstract at  
23       the top of that article set it out.

24                      ...excess risk for both acute

25                      lymphocytic leukaemia and acute

1 non-lymphocytic leukaemia were associated  
2 with intrauterine and paternal  
3 preconception diagnostic X-ray  
4 exposure...

5 So there was at least some study  
6 showing -- and I think in fairness I should say that if  
7 you look at page 637 there is reference to that in  
8 greater detail, but the study contains a number of  
9 methodological difficulties which --

10 A. I think that is a fair comment.

11 I guess my reaction is, I am aware of  
12 this report. It is one study which finds a number of  
13 things that are not consistent with the consensus  
14 findings as summarized in a document such as UNSCEAR.  
15 For example, just at the bottom of the abstract I  
16 picked out a sentence: No relationships were found  
17 with late maternal age. And I believe it's often found  
18 that late maternal age is associated with leukaemic  
19 children.

20 So, it's not to say the study was  
21 necessarily wrong. Every study has limitations and it  
22 often picks up positive findings which turn out not to  
23 be generally true, it often picks up or fails to pick  
24 up positive findings which are generally true.

25 I think this is one study amongst many

1 that have looked at the subject, and I don't think it  
2 would be sufficient to change our view of what the  
3 risks are.

4 Q. But of the level of risk, the range  
5 of uncertainty was not discussed in your memorandum to  
6 Mr. Armitage, at all, I take it, so that workers  
7 wouldn't necessarily have had access to the analysis  
8 which you and I have just gone through very briefly; is  
9 that correct?

10 I mean, you drew the conclusion --

11 A. I haven't read through it recently,  
12 but I would think there should be some estimation of  
13 the uncertainty in some of these risks. For example, I  
14 am quite sure that there would be a comment that for  
15 many of the risks which may apply to in utero exposure,  
16 there may well be a threshold of some substantial  
17 amount which is greater than the annual dose limit,  
18 occupational dose limit.

19 So if we assume anything about that, we  
20 are perhaps assuming a risk that can't occur within the  
21 normal framework. So I think there must be some  
22 discussion of the uncertainty.

23 Also, this was a report to the manager of  
24 the health and physics services department. I  
25 certainly would write it in a different way if it were



1 to the worker representatives, for example.

2 Q. Going again to the review, the  
3 10-page review on page 4, the third paragraph, second  
4 full paragraph:

5 It should be noted that there is no  
6 suggestion of any other excess cancers in  
7 the populations of children of  
8 radiation-exposed parents.

9 Was the Shanghai study taken into account  
10 when that statement was made?

11 A. When it says others, other excess  
12 cancers, I presume it means other than leukaemia

13 Q. Other than leukaemia, that's fair  
14 enough.

15 A. And the Shanghai study was looking at  
16 leukaemia, was it not.

17 Q. Yes. It's referred to in the  
18 abstract, two forms of that.

19 A. I think it is certainly well accepted  
20 that radiation is associated with and probably causes  
21 leukaemia. It causes it in children when they are  
22 irradiated and it may cause it in children when the  
23 parents are irradiated, that's not so clear.

24 Other cancers, there is not such an  
25 association, for example, in the Gardner study.

1 Q. Not to be an alarmist on this, but on  
2 page 5, on the next page that have extract you set out  
3 in paragraph beginning "The main effects of concern",  
4 and then early fetal loss is discussed, and then  
5 thirdly, congenital malformations and so on, these are  
6 some of the consequences for potential consequences, I  
7 don't want to put it too high, but these are some of  
8 the possible consequences of prenatal irradiation, are  
9 they not?

10 A. Certainly in the Japanese population,  
11 some of the children who were irradiated in utero  
12 developed severe mental retardation.

13 Q. Could you describe it?

14 A. There is a detailed analysis of that,  
15 and the risk rate is .4 per sievert, 40 per cent per  
16 sievert for a high dose exposure, and all of these  
17 children who were studied did receive high dose  
18 exposures in utero.

19 The analysis suggests that you can't  
20 excluded a threshold of about .2 sieverts which means  
21 that below that level there is no risk.

22 However, we do allow for the risk as if  
23 it were possible at lower levels.

24 The question of mechanism comes in  
25 because this is not what I would call -- well, I guess

1 it is controversial whether there's a stochastic  
2 effect, but it's not the kind of stochastic effect I  
3 was talking about in I my direct evidence where  
4 possibly a single damaging event can lead to the mental  
5 retardation.

6 What we are talking about here is a  
7 disruption of the development of the brain at a  
8 specific time between the 8th and 15th week of  
9 gestation, and it probably has a mechanism which  
10 requires high doses.

11 [10:38 a.m.]

12 This is the view of UNSCEAR and ICRP and  
13 other people who have summarized the situation, but we  
14 do allow for it in our radiation protection practices.

15 When I say that I don't believe there  
16 needs to be special protection for women before they  
17 are aware of their pregnancy, I am assuming that by the  
18 8th week of pregnancy a woman would be aware and the  
19 law requires to report this condition to her employer  
20 who then takes special efforts to reduce her exposure.  
21 And what Ontario Hydro does is to remove such a person  
22 from the exposure.

23 Q. And I think the problem arguably  
24 occurs prior to the 8th week --

25 A. There is no evidence at all that it

1 occurs prior to the 8th week, this particular problem.

2 Q. That particular problem?

3 A. There's a risk that I gave you for  
4 the 8th to 15th week, there's about a fourfold lower  
5 risk between the 15th and the 25th, I believe, there's  
6 no risk before the 8th week, nor would there be  
7 expected to be, because of the mechanism that's  
8 involved. At least this is the carefully studied  
9 opinion of ICRP, UNSCEAR and people that they refer to.

10 Q. Very well. I think I will leave that  
11 exhibit for now. And can we turn to the childhood  
12 leukaemia study itself, which I only want to refer to  
13 the abstract, that's Exhibit 520.17 filed in connection  
14 with Interrogatory No. 9.9.26.

15 And the only point I really want to make  
16 there is that on the third page of the abstract, middle  
17 paragraph, where there was a note that there was a need  
18 for further investigation. Do you know if further  
19 investigations have been carried out?

20 A. Sorry. Can you tell me where you  
21 are --

22 Q. Sorry. Exhibit 520.17.

23 A. Yes.

24 Q. The Roman numeral 3, third page of  
25 the abstract.

1 A. Yes.

2 Q. The middle part of that page, the  
3 paragraph beginning:

4 This study did not detect levels of  
5 childhood leukaemia in the vicinity of  
6 nuclear facilities that were  
7 significantly different than the expected  
8 level, however the levels that were  
9 detected in the vicinity of the nuclear  
10 generating stations indicate the need for  
11 further investigation.

12 Do you know if further investigation has  
13 been carried out?

14 A. Well, yes it has. This study is what  
15 is called, in epidemiological terms, a descriptive  
16 study, looks at populations and it has limitations, and  
17 I think it's also considered what you might call a  
18 hypothesis generating study, it identifies potential  
19 risks for future investigation but it can't reach firm  
20 conclusions about whether the risks are caused by  
21 specific factors.

22 And so in answer to your question, this  
23 is the Phase 2 Report. The study was done in two  
24 phases, this is the final report, it's essentially all  
25 of the information that can be generated from this kind

1 of a study and it does recommend further studies.

2 Because one of the risk factors  
3 identified in the Gardner study, which was really what  
4 had prompted this study, was radiation exposure of the  
5 fathers, a follow-up study was organized, again  
6 supported by the AECB and carried out by the Ontario  
7 Cancer Research and Treatment Foundation to look at the  
8 cases that had been identified here in a case control  
9 way and ask whether these cases were more represented  
10 amongst the children of radiation workers using the  
11 National Dose Registry of Canada.

12 That study has been under way for about a  
13 year, I think it's in its final review phases but it  
14 hasn't been published yet.

15 Q. I see. Let's then move on to the  
16 other study which I would like to refer to, Exhibit  
17 554, this has to do with tritium releases. Is that  
18 also a descriptive study?

19 A. Oh sorry. This is the birth defects  
20 study?

21 Q. That's correct. Tritium Releases  
22 from the Pickering Nuclear Generating Station and Birth  
23 Defects and Infant Mortality in Nearby Communities.

24 A. And your question is, is this a  
25 descriptive study?



1 Q. Is this also a descriptive study?

2 A. Yes, it is.

3 Q. And they also conclude, if I remember  
4 correctly, at page 3 of the executive summary and --  
5 I'm sorry, page 4 of the executive summary, the need to  
6 do further investigations.

7 A. Well, this is the recommendation of  
8 these authors, yes.

9 Q. Yes. Yesterday we spoke about some  
10 of the methodological difficulties that one faces in  
11 this area. Do you have any comments on the  
12 appropriateness of the methodology used in this study?

13 A. Well, I don't think I would be  
14 critical of the methodology, but it is a descriptive  
15 study which has limitations.

16 Basically a descriptive study, as opposed  
17 to an analytical study - and we have talked about some  
18 of those kinds of studies, case control studies and  
19 cohort studies - is limited in that it is only  
20 comparing a population with another population, in this  
21 case with the population of Ontario, and so you can't  
22 control for specific risk factors that are known.

23 For example, one of the outcomes that was  
24 looked at here was Down's Syndrome, and it's known that  
25 Down's Syndrome increases with maternal age. Well,

1 when you are dealing with a population you can do a  
2 correction, as they did here, for the average age of  
3 mothers for that population, say, living around  
4 Pickering compared with Ontario, but you can't look at  
5 the cases, the mothers of children who had Down's and  
6 decide whether or not they were of late maternal age.

7 So, I am saying that there are inherent  
8 limitations in this kind of a study. It's the kind of  
9 a study that you do first in order to generate  
10 hypothesis about what should be investigated, and there  
11 were a very large number of associations looked at  
12 here, ranging from infant deaths, birth defects,  
13 specific defects in association with emissions and so  
14 forth, and I think it could be viewed more or less as a  
15 epidemiological screening method. It has limitations.

16 Q. I just want to draw your attention to  
17 two points and perhaps - I don't want to belabour this  
18 report to great length - can we turn to page 6 of the  
19 report under the heading 3.2, Use of Tritium Release in  
20 Ground Monitoring Data.

21 A. Yes, I have it.

22 Q. I would like to raise two points.  
23 The first point has to do with the second paragraph:

24 Four-month high in average tritium  
25 emission released that was categorized

1                   into quartiles..., and so on, and then  
2           for some reason another the fourth quartile was split  
3           to create a fifth category.

4                   Can you tell me what effect that would  
5           have and why that was done? Do you have any  
6           information on that?

7                   A. Well, I mean, I wasn't involved at  
8           all in the study and I can't really tell you why the  
9           authors chose to use certain things. They were  
10          certainly limited in that they had certain information  
11          about birth defects, they had certain information about  
12          emissions and about concentrations in the environment  
13          which they could obtain from Ontario Hydro reports or  
14          from Health and Welfare Canada or from other sources,  
15          that was about all they had to work with, and I presume  
16          that they have used the data in various ways to try to  
17          get at the question they were directed toward which  
18          was, are there excess risks of birth defects in areas  
19          surrounding Pickering.

20                  Q. Well, the second point in this area  
21          is the very bottom paragraph which states that they  
22          chose locations of Health and Welfare monitoring data,  
23          chosen over Ontario Hydro data for a couple of reasons.

24                  And then on the next page, page 7, they  
25          averaged stations 4 and 5. And I would like to turn to

1 appendix C3 which is a map showing the locations of  
2 those stations. And the numbers within squares show  
3 the Health and Welfare monitoring stations. I take it  
4 tritium is airborne, and so --

5 A. Both air and waterborne.

6 Q. Air and waterborne. So stations 4  
7 and 5 were averaged for one reason or another. I take  
8 it the prevailing wind would run roughly from the  
9 bottom of this page to the top of this page; is that  
10 correct? The left-hand side is points monitored.

11 A. Well, as I said yesterday, although  
12 this is a more probable direction than others, there's  
13 quite a large distribution of the winds because this is  
14 a lake site, but generally you are correct.

15 Q. So the monitoring stations would not  
16 necessarily capture the emissions which flowed from the  
17 bottom of this page to the top of this page, only  
18 station 5 would really be squarely in the path of the  
19 wind; is that correct, for a significant portion of  
20 time. It may be helpful to refer -- I believe there's  
21 a wind --

22 THE CHAIRMAN: I'm sorry, what page are  
23 we looking at when you say this page?

24 MR. M. CAMPBELL: C3 of the -- appendix  
25 C.

1 THE CHAIRMAN: It looks like schematic  
2 diagram of what?

3 MR. M. CAMPBELL: It's a map of the site,  
4 the Pickering environmental monitoring stations are  
5 described.

6 DR. WHILLANS: Well, as I work on this  
7 map normally I am fairly familiar with the area and I'm  
8 just trying to orient with respect to where the  
9 stations that I know are, okay.

10 I don't know why they chose to average 4  
11 and 5 except that our site No. 2, which is in the line  
12 that you indicated, tends to have the highest tritium  
13 levels and Health and Welfare don't have a site at that  
14 point.

15 I am speculating because I don't know why  
16 the authors -- the authors are from Health and Welfare  
17 Canada, they may have conversations with the people who  
18 do the monitoring that suggested it was appropriate.

19 MR. M. CAMPBELL: Q. Well, just to  
20 complete our discussion on this, at page F9 there is a  
21 wind rows histogram at 10 metres. And would I be fair  
22 in assuming that...

23 DR. WHILLANS: A. That's the kind of  
24 data that I was referring to--

25 Q. Yes.



1                   A. --when I said that there wasn't a  
2                   high probability that it would flow in any one  
3                   particular direction.

4                   Q. But is there a tendency to flow  
5                   generally from west to east as opposed to from east to  
6                   west, as shown on this histogram?

7                   A. Well, I guess you are noting that the  
8                   highest probabilities tend to be on the west side.

9                   Q. Yes.

10                  A. You note at the bottom, these are  
11                  directions of coming from, all right, so that means  
12                  that it tends to be coming from the west to the east,  
13                  either northeast or southeast, but there is quite a  
14                  distribution.

15                  And, as we said, there are meteorological  
16                  monitoring stations on the plant which keep track of  
17                  this data, I believe Mr. Johansen said, on an hourly  
18                  basis, so we have that kind of information whenever  
19                  there is a release.

20                  Q. I understand.

21                  A. And we pull that into our estimates.

22                  Q. I'm only dealing for my purposes with  
23                  this study and the limitations which we have discussed  
24                  earlier.

25                  A. Yes.



1 Q. One other question on this.

2 A. Well, just to be clear, that says  
3 that the -- well, on your map or page C3 - yes, there  
4 is an arrow showing where north is - so when you said  
5 from the station toward the area of 2 or 6 station,  
6 that would be into the northeast, which is one of the  
7 predominant areas, right.

8 The other one being offshore, so you  
9 wouldn't do a study there.

10 Q. Yes. One other question having to do  
11 with appendix G, and I accept your lack of familiarity  
12 with the nature of this study, but do you have any  
13 explanation why in figure 1 on page G1 there is such an  
14 increase in the number of cases in the year  
15 approximately 1978.

16 If you look at the next, Down's Syndrome  
17 figure 3, there's also something of an increase, and if  
18 you look at central nervous system disorders, this is  
19 figure 4, there's also something of an increase and  
20 congenital heart defects, again '78 there's quite an  
21 increase.

22 Do you have any idea why that might have  
23 occurred?

24 A. Well, of course, this goes to the  
25 heart of the study that prompted AECEB to ask Health and

1 Welfare to do this review.

2 I believe I referred to it in my direct  
3 evidence. Mr. David McArthur had published some  
4 findings which were based on this surprising change.

5 Now, I'm not familiar in detail with the  
6 reason for that. You can see it isn't just an isolated  
7 case in one year, it's not the time when Pickering B  
8 came on, and my understanding - and I could be wrong -  
9 is that there are also changes in the recordkeeping  
10 system for birth defects at that time and I believe  
11 that's related to this phenomenon.

12 Q. So the concept of further studies  
13 makes a lot of sense to you; is that correct, given all  
14 these variables, the need for further studies?

15 A. Well, I think if you read the full  
16 conclusions rather than just the one that you mentioned  
17 to me, you will find that although there are some still  
18 unexplained changes, the levels of birth defects in the  
19 Pickering area are less than in the province as a  
20 whole.

21 The increases don't correlate with either  
22 emissions in most cases or environmental monitoring  
23 levels of tritium, so if there is a real difference  
24 it's not necessarily related to tritium emissions.  
25 And, yes, there are still some unexplained results

1 which probably deserve follow-up study, but I don't  
2 think it would necessarily be this kind of study.

3 One of the problems with birth defects,  
4 unlike the cancer data we talked about earlier, is that  
5 the registration of these defects is not done in the  
6 same way. Depending on the defect it may not be  
7 registered at all. The registration is distributed  
8 over different public health units, it's integrated but  
9 not in the same comprehensive way that cancer data is.

10 So there are lots of opportunities for  
11 record problems, basically. Not to suggest that that  
12 may be the answer, but that is one of the limitations  
13 when you try to do studies in this area.

14 Q. I understand. Thank you, Doctor.

15 [10:55 a.m.]

16 I would like to turn now, for a few  
17 moments, to the issue of standards, and in particular I  
18 would like to draw your attention to three exhibits.  
19 Exhibit 655 which is a document from the Government of  
20 Canada, AECB Proposals for the implementation of ICRP  
21 60 Recommendations, and the second exhibit I would like  
22 to discuss with you is Exhibit 662, the National  
23 Radiological Protection Board, and then lastly, Exhibit  
24 665, the Proposed Regulations for Emission Standards  
25 for Radionuclide Emissions of the Commonwealth of

1 Massachusetts.

2 I take it the first exhibit, 655, the  
3 AECB material is AECB's proposals to implement the most  
4 recently ICRP thinking in this area, and so as a result  
5 standards have become more stringent; is that correct?

6 A. I think that is fair, yes.

7 Q. I will not take you through this in  
8 detail. I am interested in page 3 of the AECB  
9 document, paragraph 2.1.9, Occupational Limit in  
10 Pregnant Women.

11 A. Yes.

12 THE CHAIRMAN: What page?

13 MR. M. CAMPBELL: I'm sorry, 655. 655,  
14 the AECB Proposals.

15 Have I misstated the number?

16 DR. WHILLANS: That is the number I have.  
17 The cover page is actually a letter from J.G.  
18 Waddington.

19 THE CHAIRMAN: What page are we on?

20 MR. M. CAMPBELL: Page 3, it's about the  
21 6th page in, but it's page 3 of the proposal. You will  
22 see the numbering at the top of the page.

23 I was referring to paragraph 2.1.  
24 Occupational Limit for Pregnant Women.

25 Q. I wanted to ask Dr. Whillans to

1 contrast the limit which is proposed by the AECB with  
2 the recommendation which was made earlier in connection  
3 with the study which you did on the Sellafield; in  
4 other words the recommendation that you made respecting  
5 or that was made respecting both male and female.

6 I'm sorry, I should perhaps refer you to  
7 the exhibit.

8 DR. WHILLANS: A. I do not think there  
9 is any inconsistency. The recommendation as I  
10 remember, I have put it away, was with respect to --

11 Q. Your recommendation I think dealt  
12 with both parents, did it not?

13 A. It dealt with both parents but it was  
14 in the time before pregnancy is declared.

15 Are we looking at 2.1.9?

16 Q. Yes.

17 A. The paragraph, the AECB is therefore  
18 proposing the following, and the paragraph says once a  
19 women has declared her pregnancy.

20 So this a different situation. I think I  
21 said that in Ontario Hydro once a pregnancy is  
22 declared, then a whole different set of protection  
23 practices take over, and we assume that that will  
24 happen within eight weeks and that will be sufficient.

25 Q. The final page of this exhibit, page



1 8, sets out the new recommendations in relatively  
2 straightforward language.

3 There is reference to the limit for  
4 pregnant atomic radiation workers, and that limit is  
5 set.

6 In your view would it be appropriate to  
7 add further recommendations for Hydro's purposes? I am  
8 not suggesting you are limited to the standards which  
9 ICRP set out, but in your estimation would it be  
10 worthwhile adding further standards to reflect the  
11 recommendation that was made in that earlier document  
12 we discussed dealing with both parents?

13 A. Well, I think what I said in that  
14 document and this morning was that there is no need for  
15 a discriminatory practice for potential fathers or  
16 mothers beyond what is the case for any radiation  
17 worker up until the time that a pregnancy is  
18 recognized.

19 I think that is essentially what ICRP  
20 says and it's essentially what the AECSB is proposing.

21 Q. I will leave the issue of the  
22 pregnant worker and just note the occupational limits.

23 The earlier occupational limits were also  
24 on page 8, a reference, just before the reference to  
25 pregnant atomic radiation workers to occupational



1 limits. I believe the earlier limit was 50  
2 millisieverts; is that correct?

3 A. That's correct.

4 Q. Then reduced to 20?

5 A. That is the present legal limit in  
6 Canada.

7 Q. Yes. Now, I wanted to discuss with  
8 you the National Radiological Protection Board document  
9 which was a document dated November 1987, Exhibit 662,  
10 an in particular, this title assists, it's a title  
11 Interim Guidance on the Implication of Recent Revisions  
12 of Risk Estimates in the ICRP, a 1987 COMO statement.  
13 That statement I take it was the genesis, if I can use  
14 that term, of the most recent standards; is that  
15 correct?

16 A. Well, to clarify, the NRPB is the  
17 National Radiological Protection Board which provides  
18 advice to the government in the U.K. on radiation and  
19 protection matters. And in 1987, some of the factors  
20 that are included in the new ICRP recommendations which  
21 lead to recommendations of lower dose limits were  
22 recognized, particularly the changes in dosimetry.

23 On the basis of that information alone,  
24 NRPB advised its government that it might be  
25 appropriate to reduce exposures of radiation workers.

1 Q. Well, can we look --

2 A. But it is called interim guidance  
3 because they are well aware that final recommendations  
4 will be coming.

5 Q. Of course. They in fact recommended  
6 15 millisieverts per year, is that correct? I would  
7 refer you to page 15 on page 4. I asked you to comment  
8 on... Less than the ICRP's.

9 A. Well, I think you should note that it  
10 says an average effective dose equivalent of 15  
11 millisieverts per year.

12 Although I will agree that it is not  
13 clear in the here, an interpretation which has been  
14 made by the NRPB of this is that they mean averaging  
15 over time for an individual and over work groups as  
16 well. It means your work-force should be on average  
17 restrained to less than 15 millisieverts averaged over  
18 time, 15 millisieverts per year.

19 So I think the difference here, compared  
20 to ICRP's, is this question of averaging. I do not  
21 think in this document it suggests that in any  
22 particular year an individual worker should be  
23 restrained to 15 millisieverts. In the fact, on that  
24 basis, Ontario Hydro's standards are that we should  
25 average to less than that value.

1 Q. Can you tell me roughly how much  
2 less?

3 A. Well, the recommendation which is  
4 accepted in a statement of intent that I referred to in  
5 the direct evidence was that we should restrain our  
6 work-force to less than 20 millisieverts for an  
7 individual in any given year, and as a long-term  
8 average, less than 10 millisieverts.

9 Q. Can we now look at Exhibit 665, which  
10 is the Massachusetts proposed regulations. If we turn  
11 to page 4 of that document there are proposals of the  
12 limits to the members of the public to receive in any  
13 year an effective dose equivalent of 10 millirems per  
14 year.

15 A millirem, can you translate that to  
16 sieverts?

17 A. That is .01 millisieverts.

18 Q. So that would be an even more  
19 stringent standard, would it not, being contemplated in  
20 Massachusetts?

21 A. Sorry. I made a mistake there. It's  
22 .1 millisieverts.

23 Q. .1?

24 A. It's easy to do. Sorry.

25 Q. Is this a more stringent standard

1 still?

2 A. Well, we are talking here about  
3 emissions from a facility. This is a public dose  
4 limit.

5 Q. Yes.

6 A. We just talked about interim  
7 guidance for work-forces.

8 Q. Yes, fair enough.

9 A. So it is more stringent than that but  
10 for that reason.

11 Are you saying is it more stringent that  
12 the AECB is recommending --

13 Q. For an equivalent population.

14 A. Well, I think not.

15 We referred earlier in this panel to a  
16 board member document from the AECB which indicated  
17 that they intend to regulate emissions from nuclear  
18 facilities on ALARA basis, and that is likely to go  
19 well beyond the 1 millisievert public dose limit.

20 For example, Ontario Hydro critical group  
21 doses, the most exposed members of the population have  
22 typically been less than half of this value. And I  
23 would expect that when the AECB finalizes their  
24 recommendations they would be looking at a limit which  
25 is, since we have achieved that, and we are looking for

1 something that is as low as reasonably achievable, it  
2 would be in that range.

3 So I do not think that this is more  
4 restrictive than what the AECB is likely to implement.

5 Q. But clearly the trend over the last  
6 many years has been an increasingly strict standard in  
7 all of these by the ICRP these other --

8 A. Generally, that is right yes.

9 Q. The very last question on the Porter  
10 Commission, this is maybe something which is really  
11 more properly put to the next panel, but I thought I  
12 might ask you. It's Exhibit 657, an extract from the  
13 Executive Summary.

14 Do you have the abstract?

15 A. Yes.

16 Q. It's the middle paragraph, slightly  
17 under the table. One observation of particular  
18 significance --

19 A. Sorry, which page?

20 Q. I'm sorry, Roman number XV.

21 A. Yes.

22 Q. The paragraph which begins, "One  
23 observation", the last sentence suggests a conclusion.  
24 This observation, they speak of the trade-offs, and so  
25 on.

1 It leaves the conclusion that:

2 Conservation is the best strategy for  
3 minimizing environmental and health  
4 impacts at least in the medium term until  
5 more benign technologies become  
6 available.

7 I would just ask you to comment on this  
8 conclusion of the Porter Commission of 1980, or would  
9 you rather level it to --

10 A. Well, it is a bit of a comparative  
11 question. But I would point out that in 1980 many  
12 factors would have been estimated at different values  
13 than we believe they are now. For example, the risks  
14 of radiation exposure we have been talking about, also  
15 the risk of indoor exposure to radon, and that of  
16 course comes into conservation measures.

17 So, I think my general comment would be  
18 that it is difficult to extrapolate a recommendation on  
19 these matters made in 1980 to that what would be made  
20 today.

21 Q. Do you have any information of how  
22 that issue would be -- what opinion would you give on  
23 that issue today? Again you may be --

24 A. I think it is difficult to ever argue  
25 that conservation isn't good strategy. Given that you



1 do not take measures in your efforts to conserve which  
2 cause risks, then that is a good strategy. But I think  
3 we have to be careful that we aren't taking such  
4 measures.

5 Q. I will leave it at that. Perhaps  
6 it's more for Panel 10.

7 MR. M. CAMPBELL: Thank you, Mr.  
8 Chairman.

9 THE CHAIRMAN: Mr. Campbell, thank very  
10 much.

11 Ms. Marlatt, are you next?

12 MS. MARLATT: Mr. Chairman, would it be  
13 possible to take a break and allow me to set up?

14 THE CHAIRMAN: Surely. We will take a  
15 15-minute break.

16 THE REGISTRAR: Please come to order.  
17 This hearing will adjourn for 15 minutes.

18 ---Recess at 11:07 a.m.

19 ---On resuming at 11:35 a.m.

20 THE REGISTRAR: Please come to order.  
21 This hearing is again in session. Please be seated.

22 THE CHAIRMAN: Ms. Harvie.

23 MS. HARVIE: Yes, me again, Mr. Chairman.

24 Mr. Chairman, it's anticipated that later  
25 this morning a group of a dozen or so Hungarian members

1 of the Canada/Hungary Energy Task Force will be joining  
2 the hearing for about 45 minutes, until one o'clock.  
3 So if there is a slight disruption while they file in,  
4 I just wanted to bring to your attention that they  
5 would be joining us.

6 The Task Force members are interested in  
7 observing an environmental assessment hearing in  
8 progress, because of their interest in environmental  
9 and regulatory approvals and the public review process.

10 The Task Force itself has members from  
11 the Canadian government, Ontario Hydro and the  
12 Hungarian government. And Hungary, I gather, is  
13 interested in developing a public consultation and  
14 environmental approval process and is therefore  
15 interested in these proceedings.

16 Thank you.

17 THE CHAIRMAN: Well, I do not quite to  
18 know what to say about that, but I guess we should all  
19 be on our best behaviour. [Laughter]

20 MS. MARLATT: I will take that as a  
21 warning, Mr. Chairman.

22 I would like to start by introducing  
23 myself to the panel members. My name is Constance  
24 Marlatt and I am counsel for the North Shore Tribal  
25 Council, the United Chiefs and Councils of Manitoulin,

1 and the Union of Ontario Indians.

2 I would like to ask the Board if we would  
3 have marked as an exhibit our materials for  
4 cross-examination for Panel 9.

5 THE CHAIRMAN: Yes.

6 THE REGISTRAR: That will be No. 668.

7 ---EXHIBIT NO. 668: Materials for Cross-Examination  
8 Panel 9, NSTC/UCCM/UOI.

9 MS. MARLATT: For the Board and panel's  
10 convenience, I would like to draw your attention to the  
11 fact that I will be referring to transcript Volume 141,  
12 May 4, 1992, and Exhibit 535, entitled: Final Report,  
13 Public Government Review and Input.

14 CROSS-EXAMINATION BY MS. MARLATT:

15 Q. Returning to our Exhibit No. 668, I  
16 would like to draw your attention to page 191 of that  
17 exhibit, which is a more comprehensive map than the  
18 than the larger map that you see that is noted up on  
19 the wall there.

20 Just to give you a background as to who  
21 my clients are and why they are concerned with the area  
22 of nuclear fuel cycle and related activities, I would  
23 like to go through with you where the reserves are  
24 located in the North Channel area. Starting with Sault  
25 Ste. Marie on the west side of the page, see Rankin and

1 Garden River First Nations, going east you will see  
2 Thessalon First Nation, Mississagi River First Nation,  
3 and located just south of Mississagi River is the  
4 CAMECO uranium refinery, which has been referred to  
5 previously in these proceedings.

6 THE CHAIRMAN: Is it shone on the map?

7 MS. MARLATT: Yes. It's shown in the map  
8 with a cross right underneath the Mississagi Reserve.

9 THE CHAIRMAN: Yes. Thank you.

10 MS. MARLATT: Q. Proceeding east you  
11 will see Blind River, and north of that, Elliot Lake,  
12 coming back south again to the North Channel is Serpent  
13 River First Nation, and Spanish River First Nation,  
14 which is now Sagamok

15 Just beside Serpent River First Nation  
16 was a Cutler Asset Company which I also believe has  
17 been referred to previously during this panel and I  
18 will be asking some questions around that company.

19 Located just east and north of Spanish  
20 River is Massey, and then close to Sudbury you will see  
21 White Fish Lake First Nation.

22 Those seven First Nations make up the  
23 North Shore Tribal Council.

24 You will see below the North Channel, the  
25 Manitoulin Island Bands. Again starting on the west

1 side, Sheshegwaning First Nation, and you will see that  
2 Sheshegwaning faces Blind River. Moving east you will  
3 see West Bay First Nation, Sheguiandah First Nation,  
4 Sucker Creek First Nation, and north of that White Fish  
5 River First Nation.

6 Those are the member bands of the United  
7 Chiefs and Councils of Manitoulin.

8 On the far east of Manitoulin Island you  
9 will see Wikwemikong Unceded Indian Band.

10 So hopefully that will give you some  
11 orientation to the questions I would like to ask of  
12 you.

13 To outline the areas in which I intend to  
14 ask questions, the areas will be as follows: General  
15 nuclear questions, nuclear technologies, First Nation  
16 issues, public consultation, social impacts, natural  
17 environment impacts, economic impacts, North Channel,  
18 and I have some short questions around siting.

19 I would like to start my questions with  
20 Mr. Johansen. I would like to refer you to page 6 of  
21 our materials, which is from Volume 128 of the  
22 transcript.

23 MR. JOHANSEN: A. Yes, I have that.

24 Q. All right. I have given you pages  
25 22547 to 22553, because in those pages you had a

1 discussion with Mr. Bullock from the Canadian Nuclear  
2 Association,

3 A. Yes, I recall that.

4 Q. And that conversation was regarding  
5 candidate sites?

6 A. Yes.

7 Q. Looking at page 22553, lines 19 to  
8 23, I believe that was the end of this particular  
9 conversation.

10 [11:41 a.m.]

11 And you stated:

12 I might just add that these criteria  
13 that we have been looking at are only  
14 technical and economic criteria in that  
15 in the end, of course, of any  
16 comprehensive siting program we have to  
17 include criteria that go far beyond  
18 these.

19 So you would agree, Mr. Johansen, that in  
20 this conversation that you had with Mr. Bullock, you  
21 were not referring to natural and social environment  
22 criteria in evaluating candidate sites; correct?

23 A. Certainly. We were only talking  
24 about, as it says, technical and economic criteria, and  
25 I was just trying to provide the context that those



1 criteria, while they are fundamental obviously, are not  
2 the only criteria that must be considered in any  
3 complete siting program.

4 Q. All right. And you would agree that  
5 in a siting program you would include natural and  
6 social environment criteria?

7 A. Yes, we would be required by law to  
8 do so and it's always been our practice.

9 Q. That's fine, thank you. Referring to  
10 page 17 and 18, this is an excerpt from the  
11 Demand/Supply Plan Report.

12 A. Yes.

13 Q. And if we look at pages 14-35,  
14 starting there with siting considerations, the heading  
15 Technical and Economic Criteria, and then we look at  
16 the next page 14-36, site categories, which proceed on  
17 to the following page 14-37.

18 Do you recall these pages, Mr. Johansen?

19 A. Yes, I have seen them before.

20 Q. Okay. You can confirm for me then  
21 that these pages are limited solely to technical and  
22 economic criteria; correct?

23 A. I am just scanning the page. I  
24 believe on your page 18--

25 Q. Yes.

1                   A. --the first bold heading is the  
2       technical and economic criteria. So my interpretation  
3       of all of this is that your pages 18, 19 and 20 all  
4       pertain to technical and economic criteria, yes.

5                   Q. Mr. Johansen, the term economic as  
6       used on page 14-35, would you agree with me that the  
7       term is used in the sense of costs incurred by Ontario  
8       Hydro rather than economic impacts on communities or  
9       regions?

10                  A. That's generally true, yes.  
11       Engineering, economics or costs, as opposed to  
12       socio-economic I believe you are suggesting.

13                  Q. Referring back to page 16 of Exhibit  
14       668.

15                  A. Yes.

16                  Q. I would like you to look at lines 10  
17       to 24.

18                  A. Yes.

19                  Q. Where in response to questions by Mr.  
20       Bullock you state:

21                         While the incremental impact of  
22                         building a new plant on an existing site  
23                         might be less if it were on an existing  
24                         site as opposed to a new site, but I  
25                         don't think that you could generalize

1 across the whole spectrum of  
2 environmental impact factors that need to  
3 be addressed, it is too site-specific.

4 All right. Would you agree, Mr.  
5 Johansen, that as part of this plan that's before this  
6 Board today you have not done a comparison of existing  
7 sites compared to new sites with regards to  
8 environmental criteria?

9 A. Not in detail. I believe that if you  
10 look at all of the material which we have produced;  
11 that is, including this exhibit, the main report and  
12 the environmental analysis report and documents such as  
13 Exhibit 50, which I believe you have taken certain  
14 excerpts out of, and responses to specific  
15 interrogatories from your client and others, that there  
16 has been information provided on the potential impacts  
17 of new unidentified sites, in a very generic sense  
18 obviously, and existing sites, but I certainly have to  
19 agree with you that there has not been documented, in  
20 Exhibit 4, a specific comparison of impacts assuming an  
21 existing site versus impacts assuming a new site.

22 But it's very site-specific and the  
23 information that is provided here does imply certain  
24 differences in impacts, but I believe the reason that  
25 no such impact assessment has been attempted is that it

1 is very site-specific.

2 Q. So it would be your evidence, Mr.  
3 Johansen, that there are no planning level criteria  
4 that could be applied to compare a new site versus an  
5 existing site?

6 A. I'm not aware of criteria that are  
7 available at the moment for that.

8 Q. All right. And you haven't developed  
9 any such criteria?

10 A. Not personally certainly.

11 Q. Okay, thank you.

12 MR. PENN: A. I presume, Ms. Marlatt,  
13 you are referring to environmental planning criteria?

14 Q. That's correct, Mr. Penn.

15 A. Because there's obviously economic  
16 and schedule criteria being applied.

17 Q. Yes. Well, we are very aware of the  
18 economic and technical area, we have just reviewed that  
19 and we will be referring to, a little later on, the  
20 economic impacts area. Thank you.

21 MR. JOHANSEN: A. I could just add that  
22 at the time of the announcement of the moratorium there  
23 was under development an environmental assessment  
24 siting strategy - I don't think I have the title  
25 right - but there was planning under way to develop

1 criteria which would have addressed the differences in  
2 impacts potentially between the existing sites that had  
3 capacity for expansion, new sites in areas where we  
4 have already done some investigations in past years,  
5 including North Channel and parts of Eastern Ontario,  
6 versus the areas of the province where we have perhaps  
7 never looked before, but that work was halted and never  
8 did get published.

9 Q. All right, Mr. Johansen. Even if it  
10 had been published, would you not agree with me that it  
11 would have been available after the Demand/Supply Plan  
12 was provided to this Board and to these intervenors?

13 A. Yes. It was being developed in  
14 conjunction with the project process, the site-specific  
15 planning and assessment process pursuant to the  
16 planning exercise which is what we are reviewing now.

17 Q. So that information was not intended  
18 to be used as part of the planning level?

19 A. That's right.

20 Q. Mr. Penn, I have a few questions for  
21 you. I would like to refer you to page 21 of Exhibit  
22 668, and this is an exhibit -- sorry, this is a page  
23 reference to Volume 124, page 21629 to page 21635.

24 Now, I have given you all of those pages  
25 attached because you may want to refer back and forth



1 to recall this testimony.

2 Do you recall this discussion that you  
3 had with AECL during cross-examination, Mr. Penn?

4 MR. PENN: A. Yes.

5 Q. And essentially what had occurred was  
6 you were being asked your opinion on the use of nuclear  
7 power as a preferred alternative for base load power;  
8 is that correct?

9 A. Yes, and in Ontario.

10 Q. Okay, thank you. And at line 14 on  
11 page 21629 you said:

12 "If there is a need, I think that  
13 nuclear power - and I am speaking  
14 personally - is an option that deserves  
15 and needs the highest review and regard  
16 in its choice."

17 And at page 21630 - just to put some  
18 focus to these questions - the Chairman noted that:

19 "But what Mr. Heintzman is asking  
20 you is what is your own opinion based on  
21 your expertise and experience in this  
22 area."

23 Okay. I would like to focus on those  
24 words. Mr. Penn, you were considering, when you  
25 expressed this opinion, you were considering economic



1 factors; is that correct?

2 A. I was considering the fact that  
3 nuclear power is a base load option for the provision  
4 of electricity to this province as a whole and that we  
5 had a history of economic delivery of electricity  
6 unreliably from nuclear power in this province and, on  
7 that basis, it was my view that this option should be  
8 considered when the time comes in the future.

9 Q. All right. So, Mr. Penn, perhaps  
10 that will clarify my next question, which is referring  
11 to page 21635 at line 20 where you state:

12 "Now, if I understand, Mr. Chairman,  
13 you want me to answer the question, what  
14 is my personal view given the  
15 characteristics only of the environment,  
16 and the economics of nuclear power and  
17 the impact on the economy of this  
18 province alone..."

19 The term economics that is being used  
20 there, Mr. Penn, did you mean solely the term economics  
21 from the viewpoint of Ontario Hydro?

22 A. No.

23 Q. Okay. Could you please elaborate on  
24 what you meant by economics of this province, and  
25 perhaps I can ask you whether or not you meant the

1 economic impact on the province?

2 A. Well, of course, Ontario Hydro serves  
3 this province, produces power at cost and I don't  
4 recall all the detail of this conversation, but when  
5 I'm talking about the economy of our province, I'm  
6 talking about it in terms of growth for improved  
7 lifestyle and health and growth in our standard and  
8 quality of life and those matters.

9 Q. Quality of life, that is an issue  
10 regarding the social impacts--

11 A. Yes.

12 Q. --of generation; correct?

13 A. Yes.

14 Q. And you are not a social impacts  
15 expert; are you, Mr. Penn?

16 A. No, I certainly wouldn't pretend to  
17 be. I have, as a project manager on a number of  
18 circumstances in Hydro while I have been employed I  
19 necessarily come in contact with and meet with people  
20 who are experts in the field and in community relations  
21 and corporate relations.

22 Q. All right, Mr. Penn. My question is  
23 more simple than that. Are you appearing on this panel  
24 as a social impacts expert?

25 A. No.

1                   Q. Thank you. Mr. Penn, are you  
2                   appearing on this panel as an expert in the area of  
3                   economic impacts?

4                   A. Well, I'm appearing here as an expert  
5                   witness with very considerable experience in the costs  
6                   and estimating of costs and interpretation of costs of  
7                   the existing nuclear system in this province and future  
8                   nuclear options.

9                   Q. Well, perhaps it would be of  
10                  assistance, because this goes back to the discussion I  
11                  just had with Mr. Johansen about what I mean when I ask  
12                  about economic impacts, and I'm asking about economic  
13                  impacts not in the sense of costs to Ontario Hydro but  
14                  in the sense of the economic impacts on communities and  
15                  regions in Ontario from Ontario Hydro's activities?

16                 Do you see the difference, Mr. Penn?

17                 A. I understand. No, I'm not qualified  
18                 and expert in that, but Mr. Mitchell Rothman, our chief  
19                 economist, was a witness for Hydro and he is the  
20                 expert.

21                 Q. All right. But he's not appearing on  
22                 this panel; is he? No?

23                 A. Not that I can see.

24                 Q. Is there anyone else on the panel  
25                 who's qualified as an economic impacts expert? I take

1 the silence to mean no, Mr. Johansen?

2 MR. JOHANSEN: A. I'm certainly not an  
3 expert in socio-economic impact assessment, but I guess  
4 I'm here to represent the environmental impact  
5 assessment function at Ontario Hydro which does  
6 incorporate, amongst many other disciplines, the  
7 assessment of socio-economic impacts.

8 And I and my colleagues in the  
9 environmental studies and assessments department rely  
10 on the input from many disciplines within the  
11 corporation and outside.

12 Q. Well, Mr. Johansen, do you consider  
13 yourself qualified then to answer the questions that I  
14 have in the area of social and economic impacts  
15 speaking as an expert for Ontario Hydro in those areas?

16 A. I wouldn't call myself an expert, but  
17 I will try to be helpful. If you can put specific  
18 questions to me that I can provide a definitive answer  
19 to, based on my experience, I have no problem with  
20 that.

21 Q. Thank you, Mr. Johansen, I appreciate  
22 that and we will actually proceed to do that. Mr.  
23 Johansen, the evidence you have given on this panel has  
24 been limited to natural environment impacts, air and  
25 water emissions; is that correct? When you talk

1 about --

2 A. Amongst other things. If I can  
3 anticipate your other question, it has deliberately not  
4 included socio-economic impacts which were dealt with  
5 extensively on Panel 6 and 7 by Ms. Quinn and Dr.  
6 Tennyson, and -- because I don't pretend to be an  
7 expert in that area because I think it's not an area  
8 where even enthusiastic amateurs should be dabbling, we  
9 chose to stay out of that and rely on the evidence of  
10 the former panels.

11 But, as I said, I'm prepared to answer  
12 questions which are within my capability and I will say  
13 if I don't feel comfortable answering it and I will  
14 deal with it on a case-by-case basis, but I will try to  
15 help.

16 Q. All right, Mr. Johansen. Just to  
17 clarify, Panel 6 was on hydraulic options, Panel 7 on  
18 fossil -- sorry, Panel 7 was on Manitoba Purchase  
19 transmission corridor; correct?

20 A. That's correct.

21 MS. HARVIE: Well, Mr. Chairman, I think  
22 perhaps what Mr. Johansen is saying that Ms. Quinn on  
23 Panel 6 described the public input leading up to the  
24 Demand/Supply Option Study and the Demand/Supply  
25 Planning Strategy and she and Dr. Tennyson discussed



1 Hydro's methods for categorizing and describing social  
2 impacts and the process that's used in environmental  
3 assessment studies by Hydro, methods that are common to  
4 all our EAs for nuclear supply.

5 Obviously neither of them spoke  
6 specifically about nuclear impacts and, as Mr. Johansen  
7 has pointed out, Ms. Marlatt will simply have to do her  
8 best with these witnesses and see how far we get.

9 MS. MARLATT: Certainly I intend to do  
10 so, Mr. Chairman. But I should point out that it was  
11 my understanding that Panel 6 was solely relating to  
12 hydraulic and if we had entered outside of that area  
13 that would have been inappropriate cross-examination.

14 THE CHAIRMAN: No, but you will recall,  
15 Ms. Marlatt, there was extensive evidence given about  
16 consultation and that wasn't confined only to  
17 hydraulic, it was confined generally to the whole  
18 planning process.

19 [12:00 p.m.]

20 I think Ms. Tennyson is going to be on  
21 Panel 10.

22 MS. HARVIE: Yes, that's correct.

23 THE CHAIRMAN: I suppose if there is any  
24 residual questions that haven't already been explored  
25 of that nature, that may be the place to do it. But



1 Mr. Johansen has offered to answer your questions. I  
2 think the way to do is to ask the question and see what  
3 happens.

4 MS. MARLATT: Thank you, Mr. Chairman, I  
5 intended.

6 MR. JOHANSEN: Ms. Marlatt, I wonder if I  
7 could add a point to what I said before, as I think  
8 about what I said before in answer to your question  
9 about the availability of criteria for planning  
10 purposes in the socio-economic area, or natural  
11 environment area. I may have left the impression that  
12 there was a total void. I was, I guess, at the time  
13 thinking about detailed criteria such as we would use  
14 in the site-specific project assessment. Certainly the  
15 document that I referred to, Exhibit 50, was part of  
16 the planning strategy documentation and it was used for  
17 that purpose.

18 So I just want to correct the  
19 misimpression if I left that impression, that there was  
20 a total absence of socio-economic criteria for planning  
21 purposes.

22 MS. MARLATT: Thank you, Mr. Johansen.

23 Q. A question for Mr. Penn. Can you  
24 tell me whether or not there was any public  
25 consultation with regards to the three different type

1 of CANDU facilities, CANDU 3, CANDU 6 an CANDU 9?

2 MR. PENN: A. Are you referring to the  
3 public information program?

4 Q. That's correct.

5 A. I personally wasn't part of that, but  
6 I would expect that there was significant information  
7 available on a 4 by 881 megawatt plant and a CANDU 3.  
8 But I doubt, because our plan published in 1989 didn't  
9 include proposals to develop either CANDU 6 or 9.

10 Q. Thank you, Mr. Penn.

11 And there was no analysis of the economic  
12 of impacts from siting a CANDU 3, CANDU 9 or CANDU 6;  
13 is that correct?

14 A. No, because other criteria associated  
15 with the lack of development and the economics of CANDU  
16 3 brought us to the conclusion at that time that the  
17 nuclear option to be considered should be a 4 by 881  
18 megawatt.

19 Q. Thank you, Mr. Penn.

20 Mr. Johansen, with respect to the social  
21 impacts area, I am moving into a couple of questions on  
22 First Nations impact.

23 Do you have experience in the area of  
24 First Nation impacts of Ontario Hydro's facilities?

25 MR. JOHANSEN: A. Some.

1 Q. Thank you. Mr. Penn, my first  
2 question is actually going to be directed at you.  
3 Looking at page 52 of Exhibit 668, line 15 to 21, this  
4 is an exchange between yourself and Mr. Heintzman for  
5 AECL about the reasons that CANDU "A" project came to a  
6 halt. And the question was:

7 "There was no other reason for the  
8 CANDU "A" project coming to a halt other  
9 than the government's decision, was  
10 there?"

11 And your answer was: "Not that I know  
12 of."

13 Were you aware that Ontario Hydro  
14 approached North Shore Tribal Council about working  
15 together with Ontario Hydro on site-specific studies?

16 MR. PENN: A. Yes. Well, I was the  
17 project manager of CANDU "A", and I was very much a  
18 part of that meeting.

19 Q. Thank you, Mr. Penn.

20 Are you aware that it is the position of  
21 the North Shore Tribal Council on this hearing, they  
22 are in opposition to any new nuclear facilities on the  
23 North Shore?

24 A. Yes.

25 I might add, Ms. Marlatt, that I spent

1 two-and-a-half days with the Chiefs of the North Shore  
2 and their representatives, having a discussion from  
3 both points of view, and visiting our facilities and  
4 dining together, and I believe there was considerable  
5 respect and regard for each view, and subsequent to  
6 that meeting I received a communication from the  
7 secretary of the North Shore Tribal Council indicating  
8 that they would be - of course, I had already asked -  
9 they would be ready to continue with further  
10 discussions.

11 Q. Mr. Penn, did the North Shore Tribal  
12 Council indicate to you that they would be willing to  
13 enter into site studies with Ontario Hydro?

14 A. No. Before we had this meeting they  
15 had written and said, as a result of our invitation  
16 that they, at this time, didn't wish to participate in  
17 a co-planning process.

18 As a result of that we got in touch with  
19 them and said, "Well, let's talk about this issue."  
20 And as I say, they subsequently after that meeting said  
21 they would like to continue the discussion. Before  
22 that was possible the moratorium on new nuclear  
23 generation was put in place by the government, so we  
24 never did have further discussions.

25 Q. All right, Mr. Penn. I don't want to

1       prolong this conversation, but can you confirm for me  
2       that when you refer to co-planning you mean in the  
3       sense of studies carried out with the Tribal Council  
4       specific to the issue of siting a nuclear station?

5               A. Well, other communities of course,  
6       and other peoples in the area were involved in separate  
7       situations.

8               It wasn't just a question of siting; it  
9       was a question of discussion of natural habitat, the  
10      ways of life, values in life, particularly spiritual  
11      values, and opportunities for employment, for  
12      education. It covered a vast range of subjects of that  
13      nature.

14              Q. Mr. Penn, would you confirm for me  
15      that those studies that you talk about in those areas  
16      that you have just listed, were with regard to where a  
17      nuclear plant should go on the North Channel, not with  
18      regard to energy policies of Ontario Hydro?

19              A. We never did discuss where a  
20      potential site might be because, while as Mr. Johansen  
21      gave evidence previously, we reviewed the shoreline of  
22      the North Channel right from Espanola to the Bruce  
23      mines, and surveyed it from the air and from the land  
24      and along the shoreline. In fact, I well remember a  
25      very beautiful occasion when I took a launch along that

1 area, to start seeing what sites were available. But  
2 we have never did come to a conclusion so we never did  
3 discuss specific sites with the North Shore Tribal  
4 Council.

5 Q. Thank you, Mr. Penn.

6 Mr. King, a couple of questions for you  
7 in the area of risk analysis.

8 Looking at page 54, of Exhibit 668,  
9 transcript references to Volume 125, page 21862, and I  
10 believe this is an exchange about risk analysis  
11 methods, and at line 10 to line 13, you said:

12 "Well, as I said before, what is your  
13 definition --

14 MR. KING: A. I missed it.

15 Okay, I have it.

16 Q. Line 10?

17 A. Yes.

18 Q. "Well, as I said before, what is your  
19 definition of 'the community'. I am  
20 saying there may be some people in that  
21 community who will accept this, but not  
22 all people in the community."

23 Q. Mr. King, are you aware of any  
24 consultation that Ontario Hydro has done with regards  
25 to the definition of risk specifically with First



1 Nations peoples?

2 A. Well, two points, I am not quite  
3 sure, without reading this, exactly what context, but  
4 irrespective of that context I believe I can still  
5 answer your question and say I am not aware of any.

6 Q. Thank you. Would you agree with me,  
7 Mr. King, that acceptable risk methodologies, by  
8 acceptable I mean to the community, such methodologies  
9 may be culturally influenced, Mr. King?

10 A. If you are talking about risk as a  
11 parameter as what we use it, it has a meaning, it's a  
12 measure of consequence and probability of occurrence,  
13 that's one matter. There are methodologies for  
14 estimated what that risk is.

15 There is another whole subject area of  
16 deciding on the acceptability or the tolerability of  
17 that risk.

18 Q. I would like you to focus your answer  
19 on acceptability.

20 A. I think I have forgotten the exact  
21 question you asked.

22 Q. Would you agree with me that the term  
23 acceptable in the context of risk methodologies may be  
24 culturally influenced?

25 A. I'm afraid I just have no experience

1       whatsoever in that area. It's not something where I  
2       have read in reading the literature, that I don't think  
3       it's a dominant consideration, a dominant area of  
4       discussion in the literature.

5               There is a lot of discussion on the  
6       questions of acceptability. In the U.K. they tend to  
7       refer to it as tolerability rather than acceptability.  
8       But I am just not familiar with the cultural aspects of  
9       that.

10              Q. Thank you. Would you accept, Mr.  
11       King, that the population groups which face the highest  
12       risk from a new facility would be those in closest  
13       proximity to such a facility?

14              A. That is correct. And that's why we  
15       have risk acceptability criteria that we use in  
16       conjunction with our risk estimation activities, and  
17       those acceptance criteria are several criteria which  
18       need to be applied, but one of them is -- or two of  
19       them relate to the individual on the boundary.

20              Some people would suggest that perhaps  
21       you should base it more on a societal impact rather  
22       than an individual impact. If you did that, though,  
23       that would allow you to, let's say, site facilities in  
24       remote areas and have a higher risk, and that is not  
25       the way we have set up our criteria.

1                   Our criterion are on individual on the  
2     boundary, so you get no benefit whatsoever from remote  
3     siting.

4                   The plant has to be just as safe in  
5     Northern Ontario as at Pickering.

6                   Q. Mr. King, the information and the  
7     work that you have done on the term acceptability, if a  
8     First Nations community rejected your analysis of the  
9     term "acceptability", would you have an alternative  
10    method to evaluate acceptability of a facility and of  
11    risk?

12                  A. Well, it's kind of difficult to  
13    answer that given that I don't know why they would have  
14    rejected it. So it really depends on why they would  
15    have rejected it, whether we would have an alternative  
16    method.

17                  Q. So the point then is, you don't know  
18    whether or not a First Nation would accept, whether  
19    Aboriginal peoples would accept your definitions of  
20    acceptability?

21                  A. The criteria that we use, the tests  
22    that we put against our risk estimation, so the risk of  
23    a plant, we have criteria to then decide whether we  
24    think that risk is low enough, those criteria are  
25    developed on being a small fraction of the background

1 risk that individuals in society bear from their normal  
2 lives. That's the basis of our current criteria and  
3 that's the basis for most of the criteria that I am  
4 aware of that have been developed around the world. As  
5 long as you can show that the risk is a very small part  
6 of what that person gets from his normal activities,  
7 then most people would generally find that risk to be  
8 acceptable.

9 Now, if that concept was rejected, then I  
10 would go back to what I previously said, I would have  
11 to know why it was a rejected to address your question.

12 Q. All right. Thank you.

13 I would like to refer to Volume 141, and  
14 Mr. Johansen, I believe this was during your  
15 cross-examination by IPPSO. I would like to start at  
16 pages 24849.

17 MR. JOHANSEN: A. Yes, I am with you.

18 Q. And you recall that you were having a  
19 discussion about the role of co-planning with First  
20 Nations with regards to siting of a high level waste  
21 disposal site?

22 A. Yes, I believe I referred to that as  
23 a general concept, based on what we have seen happen in  
24 the Moose River case, for instance.

25 Q. Well, you refer to the hydraulic area

1 on the following page, 24850.

2 A. Yes.

3 Q. Where you say, and you are referring  
4 to the planning of course for hydraulic development,

5 "But clearly what it indicates is that  
6 the location of any Ontario Hydro  
7 facility in the areas where there are  
8 native interests is going to be done in a  
9 way that is acceptable to native groups  
10 and government and other public groups  
11 that are concerned."

12 So you would include, in your definition  
13 of any Ontario Hydro facility, I presume, a new nuclear  
14 station or disposal facility?

15 A. Yes, that would be my view, yes.

16 Q. Thank you.

17 And at line 17 to 25 of that same page.

18 A. This is 49 or 50?

19 Q. 50. You agreed with counsel for  
20 IPPSO that you have not yet done any consultation with  
21 native communities on the topic of high level disposal  
22 concepts; correct?

23 A. I am looking at the question there  
24 and I believe there is a typo. "It would Alberta  
25 possibility..." Clearly that's not the right word.

1 Q. I would refer you to line 21.

2 A. Okay.

3 Q. You were asked:

4 "You haven't actually done any  
5 consulting of native communities yet, you  
6 don't know who to talk to yet?"

7 And you said "No."

8 A. Yes, we certainly haven't started  
9 siting.

10 However, the program has been under way  
11 for many years and has entered the environmental  
12 assessment review process or stage. And there has  
13 been, under the auspices of the federal environmental  
14 assessment review office, considerable notification,  
15 open house meetings, through the various communities in  
16 five different provinces, including Ontario, and  
17 scoping sessions in pretty well the same communities in  
18 those five different provinces. But that certainly is  
19 not equivalent to what I would call a consultation  
20 program such as we would carry out in conjunction with  
21 a site-specific environmental assessment project.

22 [12:22 p.m]

23 And I should add that AECL, beginning in  
24 about 1984, I think it was, undertook a significant  
25 public consultation program lasting several years to



1 identify broad-based issues, and they worked over  
2 several years with a number of special interest groups  
3 to get some handle on the priority issues that needed  
4 to be addressed in concept assessment. So I think  
5 that's the context.

6 Q. Mr. Johansen, you would agree with me  
7 then that consultation with First Nations should occur  
8 prior to the siting phase certainly, from Ontario  
9 Hydro's perspective?

10 A. Prior to or in conjunction with.  
11 There certainly should be consultation with all  
12 members, or at least representatives of all significant  
13 walks of life, including native groups and particularly  
14 in that I guess it's fairly obvious that their numbers  
15 in areas of the Canadian Shield are not insignificant  
16 and they do represent a significant sector of the  
17 general population, and that is recognized.

18 Q. All right, Mr. Johansen. The AECL  
19 consultation program that you just referred to, can you  
20 tell me, do you know, whether or not that was specific  
21 to First Nations, whether or not there was any part of  
22 that consultation program that was specific to First  
23 Nations?

24 A. Well, certainly First Nation issues  
25 were addressed. If you are asking me were there First

1 Nations representatives involved in the groups, I'm  
2 afraid I can't, off the top of my head, answer that.

3 Q. Okay, thank you.

4 A. I could just add perhaps that I know  
5 that invitations went out to something like 50  
6 different special interest groups at the beginning of  
7 that program and they didn't all choose to participate,  
8 but as to who was in, in general, and who chose to not  
9 participate, I don't recall.

10 Q. In the same volume I would like to  
11 refer to a conversation that you may recall, Mr.  
12 Johansen, and Mr. Penn had a conversation with IPPSO,  
13 regarding the issue of how signs for a nuclear waste  
14 disposal site would be marked. Do you recall that  
15 discussion?

16 MR. PENN: A. Yes.

17 Q. Okay. Mr. Penn, I believe on page  
18 24877, I believe this rather extensive conversation  
19 ended on this page when you made the reference, line 13  
20 to 17:

21 "All I would like to say is that I  
22 am surprised that languages could go out  
23 of existence in 1,500 years. I seem to  
24 recall the Scriptures date back to at  
25 least two-and-a-half thousand years."

1 Just to give some perspective to this  
2 issue, Mr. Penn, you are aware of course that the  
3 inhabitants of Ontario 500 years ago were the  
4 Aboriginal peoples?

5 A. I think I can agree with that. My  
6 Canadian history is not as good as it should be.

7 Q. All right. Would you agree with me,  
8 Mr. Penn, are you aware that they would also be the  
9 inhabitants of Ontario 1,000 years ago?

10 A. I believe so.

11 Q. Thank you. So in fact the languages  
12 that would have been spoken in Ontario 500 and 1,000  
13 years ago would have been Aboriginal languages. Do you  
14 agree with that?

15 A. Yes.

16 Q. Thank you.

17 A. They would be Inuit as well I guess,  
18 and Mongolian dialect and Icelandic.

19 And the point I was trying to make here,  
20 and someone brought it to my attention, that today  
21 people still understand and can speak the languages  
22 that were placed on tablets from which our Scriptures  
23 came. They can speak it today, they can understand it  
24 today and, in fact, it dates back nearly 5,000 years  
25 not two-and-a-half.

1 I was just trying to make the point that  
2 if we could communicate with ourselves over that span  
3 of time in those social eras, then I believe it's  
4 reasonable and logical to suggest that in the future  
5 with added technology we would be able to communicate  
6 again.

7 Q. Thank you, Mr. Penn. That may be the  
8 point you were making but I was asking a slightly  
9 different question.

10 500 years ago and 1,000 years ago tablets  
11 written with Scripture languages would not have been  
12 comprehensive I believe to the inhabitants of Northern  
13 Ontario -- to Ontario; correct?

14 A. No, but we are talking about  
15 something that's relevant in the future, not in the  
16 past.

17 Q. Thank you, Mr. Penn. I recognize  
18 that is what you are talking about, that is not what my  
19 question is directed at.

20 I would like to know whether or not you  
21 would agree with me that the social and linguistic base  
22 of any particular land can change quite dramatically in  
23 time periods such as 500 years; correct?

24 A. I agree with you, in the past it has  
25 changed.

1 Q. Thank you. In the area of public  
2 consultation, I would like to refer you back to Exhibit  
3 668 and, I suppose - although I am still not quite  
4 certain who I should direct my public consultation  
5 questions to with regard to nuclear facilities - Mr.  
6 Johansen, should I try with you?

7 MR. JOHANSEN: A. I will be glad to  
8 help.

9 Q. All right. This interrogatory on  
10 page 56, Exhibit 668, we will need a number for it, it  
11 is ID No. 9.4.48.

12 THE REGISTRAR: That is given 520.152.

13 MS. MARLATT: Thank you.

14 ---EXHIBIT NO. 520.152: Interrogatory No. 9.4.48.

15 MS. MARLATT: Q. This interrogatory  
16 identifies all consultation by Ontario Hydro with  
17 Aboriginal peoples potentially affected by nuclear  
18 development.

19 The response was:

20 "A site selection study in the North  
21 Channel area was carried out in 1974 to  
22 1978. During this study, meetings  
23 were held with Aboriginal peoples in  
24 February, April, May and August of 1975.

25 "Two meetings were held between

1 Ontario Hydro and the North Shore Tribal  
2 Council and United Chiefs and Councils of  
3 Manitoulin in 1980 to discuss CANDU "A".  
4 A visit was also arranged for  
5 representative council members to visit  
6 Pickering and Darlington October 1990."  
7 Now, Mr. Johansen, it's my recollection  
8 that the Demand/Supply Option Study was produced  
9 between 1984 and 1986; correct?

10 MR. JOHANSEN: A. The option study.  
11 That sounds about right.

12 Q. And the draft Demand/Supply Planning  
13 Strategy 1987 to 1988?

14 A. Again, Mr. Penn can correct me, but  
15 that sounds about right.

16 Q. And the Demand/Supply Planning  
17 Strategy Document was finalized March, 1989?

18 A. I believe that's correct.

19 Q. Okay. So in the 1980s when the  
20 Demand/Supply Plan was being put together, there were  
21 not meetings between the nuclear division and North  
22 Shore Tribal Council; is that correct?

23 MR. PENN: A. I would have to check, Ms.  
24 Marlatt, but I recall -- because I was involved in all  
25 these processes and all the hearings that occurred from



1 1986 onwards, and we had -- when I say we, I'm talking  
2 about senior members of staff at Hydro - had numerous  
3 meetings with opinion leaders, with church groups, with  
4 interested public to get their input into the  
5 Demand/Supply Planning Strategy and we spent a  
6 considerable period of time, and Ms. Alana Quinn could  
7 go into a great deal of detail on it, so..

8 THE CHAIRMAN: Surely, Ms. Marlatt -  
9 excuse me, Mr. Penn - your clients are aware of the  
10 extent of the consultation.

11 I don't know what the purpose -- Ms.  
12 Quinn and Dr. Tennyson and others have extensively  
13 given evidence on this subject.

14 MS. MARLATT: Well, I don't recall any  
15 evidence being given on the issue of nuclear  
16 consultation with First Nations on --

17 THE CHAIRMAN: But your people would know  
18 what extent there was and wasn't.

19 MS. MARLATT: Yes, that's true. And  
20 what I'm asking Mr. Penn is to confirm my understanding  
21 that there were not meetings between the nuclear  
22 division of Ontario Hydro and the North Shore Tribal  
23 Council between the 1970 study and 1990?

24 THE CHAIRMAN: Doesn't the interrogatory  
25 answer that question?

1 MS. MARLATT: Well, it seems to me it  
2 does. I just want to ensure that Mr. Penn would agree  
3 with that interrogatory.

4 THE CHAIRMAN: Well, I think he's  
5 answered.

6 MS. MARLATT: All right, thank you.

7 THE CHAIRMAN: Is there anything you want  
8 to add to that, Mr. Penn?

9 MR. PENN: I don't think so, Mr.  
10 Chairman. I just wanted to put on record my answer  
11 that I am almost certain that there would be  
12 consultation with all interested people in Ontario  
13 during the process of putting together the  
14 Demand/Supply Planning Strategy which led to the DSP  
15 Plan and, of course, as this interrogatory notes, when  
16 we started in the definition phase of CANDU "A", there  
17 was meetings with the North Shore Tribal Council and  
18 the Chiefs, and I personally testified that I met with  
19 them.

20 MS. MARLATT: Q. That's correct. Thank  
21 you, Mr. Penn. Page 59 of Exhibit 668, there's a  
22 document there, the Goldfarb Consultants Report,  
23 Qualitative Report on Attitudes to Locating a Nuclear  
24 Power Plant at Various Sites.

25 Now, Mr. Johansen or Mr. Penn, could

1 either of you confirm for me, was this report  
2 commissioned by Ontario Hydro?

3 MR. JOHANSEN: A. Sorry. The title on  
4 page 59 indicates that it is a research report for  
5 Ontario Hydro and there's a project number, and  
6 although I'm not intimately familiar with this or at  
7 least I wasn't at the time indicated here, June, 1990,  
8 it suggests to me that the report was commissioned by  
9 Ontario Hydro, and it's not an unusual thing for  
10 Ontario Hydro to do.

11 Perhaps Mr. Penn could confirm that. I  
12 believe that's true.

13 MR. PENN: A. Ontario Hydro retains  
14 Goldfarb and Associates Company Consultants and other  
15 polling firms to assist us in understanding peoples'  
16 interests and thoughts and level of understanding.

17 Q. All right. I have questions  
18 regarding the process by which this report was put  
19 together. Is there anyone on the panel who could help  
20 me with those questions, Mr. Johansen?

21 THE CHAIRMAN: Well, again, you just ask  
22 the questions and if they can answer them they will;  
23 and if they can't, they won't.

24 MS. MARLATT: All right.

25 Q. Mr. Johansen, how many persons

1 attended each focus group?

2 MR. JOHANSEN: A. I can answer your  
3 earlier question, I guess, by saying that I really  
4 don't know what the process was.

5 I suppose I could read the document and  
6 deduce it, if it's indicated in there, but I really  
7 have no knowledge of the numbers and procedural details  
8 of this. I was just generally aware that it was being  
9 conducted and I have now seen some of the results.

10 Q. All right, Mr. Johansen. Had you  
11 seen this report and read it before you were provided  
12 with it from the North Shore Tribal Council yesterday?

13 A. I'm not sure. As Mr. Penn indicated,  
14 we have a number of public opinion surveys from time to  
15 time and I may have seen something or someone's summary  
16 of it. It's certainly generally familiar to me, but I  
17 don't believe that I had a full copy of this document.

18 Q. I should note for the record --

19 MR. PENN: A. I had a presentation of  
20 this information, I recall, before this report was  
21 published, probably in about May of 1990, but I hadn't  
22 read the report before I saw it in your materials.

23 Q. Had anyone read the report on the  
24 panel prior to seeing it in our materials? I assume  
25 the silence is no. Mr. Penn?

1                   A. There wasn't much need for me to read  
2     the report because I had a presentation and  
3     subsequently, of course, we ceased work on this nature  
4     of issue.

5                   Q. Okay. Mr. Penn, then, perhaps I  
6     should direct some of these questions at you and if you  
7     don't know the answers you can just tell me that.

8                   You may recall some of the answers though  
9     from the oral report that you were provided with in May  
10    of 1990?

11                  A. About that time.

12                  Q. Okay. Mr. Penn, do you recall how  
13    many people attended each focus group?

14                  A. No, I don't have that knowledge.

15                  Q. So you don't know who they were or  
16    who the individuals were who attended the focus groups?

17                  A. No. In the presentation I had it was  
18    of the results of the review by Goldfarb and  
19    Consultants.

20                  Q. So any of the information regarding  
21    the process by which focus groups were created, who  
22    chose them, what criteria, any of those issues you do  
23    not know the answers to; correct?

24                  A. I don't personally know. I assume  
25    that Goldfarb, which is a pretty prestigious business



1 in this field, do conduct these matters properly,  
2 otherwise the results obtained would be useless.

3 Q. Thank you, Mr. Penn.

4 MS. MARLATT: I do have a number of  
5 questions around this report, Mr. Chairman. Would it  
6 be easiest to ask them in the form of an undertaking or  
7 subsequent interrogatory?

8 THE CHAIRMAN: I don't know how they can  
9 improve on their knowledge and what they have got now.  
10 It's easier to ask Goldfarb, I suppose.

11 MS. MARLATT: That's what I was  
12 wondering, Mr. Chairman.

13 MS. HARVIE: Well, Mr. Chairman, I have  
14 some preliminary difficulties with us undertaking such  
15 work.

16 First of all, it's not, to my  
17 understanding, any evidence that we are relying on and  
18 this was introduced by Energy Probe, and I am hard  
19 pressed to see why we should do this.

20 We are not seeking any nuclear approvals  
21 in this context, in a planning context, and we are not  
22 proceeding with any sighting studies and presumably at  
23 the time that either we get approvals to proceed with,  
24 or at least the nuclear moratorium is lifted, at the  
25 time decisions will be made about whether this kind of



1 work is useful and assists Hydro in carrying out its  
2 sighting work.

3 And I can't see how this is probative of  
4 anything that this Board has to decide.

5 MS. MARLATT: Mr. Chairman, the report  
6 was commissioned by Ontario Hydro. I recognize it was  
7 not put into evidence by Ontario Hydro, but it was  
8 commissioned by them, I would assume that it was read  
9 or the oral report was listened to by the nuclear  
10 division, and as part of their planning on nuclear  
11 issues, I think it is relevant to know what their  
12 understanding is of the attitude of communities in  
13 Ontario to nuclear power.

14 THE CHAIRMAN: I don't quarrel with that.  
15 I think what you were asking Mr. Penn to answer was  
16 the methodology used by the consultants in arriving at  
17 the report, and I don't see how they can possibly  
18 answer that.

19 MS. MARLATT: Well, obviously they can't,  
20 Mr. Chairman, but I would imagine that it would be part  
21 of their thought process, that if they are looking at a  
22 report that they have requested from Goldfarb  
23 Consultants that these would have been some of the  
24 questions they would have asked, and perhaps we can  
25 just leave it at that.

1                   The methodology was not questioned, Mr.  
2 Penn, said that he accepted the fact that Goldfarb's  
3 methodology was good and that's the end of that.

4                   THE CHAIRMAN: Well, I think you have to  
5 leave it at that; don't you?

6                   MS. MARLATT: Yes. Thank you.

7                   MR. PENN: Well, I would say, Ms.  
8 Marlatt, that I didn't commission this study, our  
9 corporate relations branch commissioned this study and  
10 my involvement was because at that time I was program  
11 manager of CANDU "A" and obviously I would be invited  
12 to hear the results of this. But I didn't have a need  
13 to question the process, I was interested in the  
14 results.

15                   MS. MARLATT: Q. Mr. Penn, are you aware  
16 whether or not there will be anyone on Panel 10 who  
17 would be more familiar with this study, and by the  
18 study, I mean the methodology used?

19                   MR. PENN: A. Well, I don't really know.  
20 I imagine that Dr. Tennyson would certainly be able to  
21 speak with knowledge on the subject.

22                   Q. Okay, thank you. That would be  
23 helpful.

24                   Going into the area of social impacts, I  
25 ask that you turn to page 99 of Exhibit 668 and, again,

I'll start my questions with you, Mr. Johansen, and Mr.  
Penn is welcome to jump in.

[12:40 p.m.]

I am looking at Interrogatory 9.4.18.

Could we get a number for it?

THE REGISTRAR: .153.

---EXHIBIT NO. 520.153: Interrogatory No. 9.4.18.

MS. MARLATT: Q. The question in the  
interrogatory was with regards to lifestyle changes for  
native people as a result of nuclear facilities.

The answer was:

As the Demand/Supply Plan is not a  
site-specific environmental assessment,  
the extent of lifestyle changes for  
Aboriginal people can only be discussed  
in general terms. Aboriginal communities  
and the lifestyle in Northern Ontario may  
be more altered if a nuclear facility  
were located there than in Southern  
Ontario due to the close relationship of  
northern people with the land and water.  
The significance of change would require  
evaluation from a local perspective  
during site-specific environmental  
assessments.

1                   Mr. Johansen, do you agree with the  
2                   answer provided in this interrogatory?

3                   MR. JOHANSEN: A. It sounds reasonable  
4                   to me.

5                   Q. Thank you. Now, I can't find, in any  
6                   of the Demand/Supply Plan documents, any study with  
7                   regards to even the general types of impacts on  
8                   Aboriginal communities resulting from a nuclear  
9                   station; is that correct?

10                  A. In any detail, and specifically  
11                  focused at native groups, you may be right.

12                  My own general reading of all of that  
13                  documentation certainly picked up many references to  
14                  special interest groups and native groups in  
15                  particular, but I believe it's correct that there was  
16                  no major treatment of native issues per se. However, I  
17                  may be corrected on that.

18                  Q. Well, certainly you will correct me  
19                  if your understanding changes and we can go through now  
20                  some of the references that you --

21                  MR. PENN: A. I would like to add one  
22                  thing.

23                  Of course we have not yet built a large  
24                  nuclear power station near a significant community  
25                  of Aboriginal people, but recognizing that possibility,

1 and also recognizing that other forms of generation  
2 would certainly involve Aboriginal people, we do have a  
3 committee and I do know that four vice-presidents met  
4 with the Aboriginal peoples to discuss these types of  
5 issues. We have a corporate Aboriginal Relations  
6 Steering Committee, which our Senior Vice-President Mr.  
7 Horton heads up.

8 So I think that I am just trying to  
9 indicate that we certainly are very conscious of the  
10 need for discussion on these types of matter.

11 Q. Mr. Penn, those committees were  
12 formed in 1990; is that correct?

13 A. Pardon?

14 Q. Those committees that were referring  
15 to, the Aboriginal Vice-Presidents Committee was formed  
16 in 1990; is that correct?

17 A. There were two committees as far as I  
18 know. There was one that involved the vice-presidents  
19 of design and construction production branch corporate  
20 relations and Mr. Horton I have just spoken about,  
21 whose sole responsibility is to head up the corporate  
22 Aboriginal relations branch. And of course we have  
23 staff that regularly meet with Aboriginal peoples,  
24 that's their role today.

25 Q. But those structures, the structures

1       that you are referring to are in 1990, 1991, 1992;  
2       correct?

3                   A.   They exist today.

4                   Q.   That's correct.

5                   A.   This means of continual discussion  
6       and consultation.

7                   Q.   Thank you, Mr. Penn.

8                   Mr. Johansen, looking at page 100,  
9       Interrogatory 9.4.49.

10                  THE REGISTRAR:   .154.

11       ---EXHIBIT NO. 520.154:   Interrogatory No. 9.4.49.

12                  MS. MARLATT:   Q.   The interrogatory  
13       confirms your general statement that socio-economic  
14       studies have not been done with the Aboriginal peoples  
15       to identify potential cultural study impacts, these  
16       studies will be done as part of the site selection and  
17       assessment work; correct?

18                  MR. JOHANSEN:   A.   Yes, that would be the  
19       intent.

20                  Perhaps I could just briefly refer to  
21       appendix 1 of Exhibit 256, which you may already be  
22       familiar with, this is the Ontario Hydro guidelines for  
23       Aboriginal relations. There are a number of points  
24       there and one which is, I believe, pertinent to this  
25       area which you are examining, suggests or makes a



1 commitment that when assessing and managing the social  
2 and environmental effects of projects, Ontario Hydro  
3 will consider the effects not only on Aboriginal  
4 communities themselves, but also on the extensive areas  
5 they rely on for resource harvesting, cultural and  
6 spiritual activities.

7 I just offer that as another element of  
8 our current planning approach and assessment approach.

9 Q. Thank you, Mr. Johansen.

10 Referring to page 101, Interrogatory  
11 9.11.5.

12 THE CHAIRMAN: Does that need a number?

13 MS. MARLATT: Yes.

14 THE REGISTRAR: What was that number,  
15 please.

16 MS. MARLATT: 9.11.5.

17 THE REGISTRAR: Thank you. .155.

18 ---EXHIBIT NO. 520.155: Interrogatory No. 9.11.5.

19 MS. MARLATT: Q. The answer to this  
20 interrogatory response was that:

21 Social acceptability was determined  
22 during the course of developing the plans  
23 in the Demand/Supply Plan. During the  
24 course of the evaluation process, a set  
25 of social criteria were developed by

1 which social acceptance was measured.

2 These criteria included the following  
3 factors: regional employment, regional  
4 economic development.

5 I would like to just stop there for a  
6 moment. Mr. Johansen, there was no study done on the  
7 potential regional employment impacts resulting from a  
8 nuclear station on the North Shore of Lake Huron; is  
9 that correct?

10 MR. JOHANSEN: A. Specifically on the  
11 North Shore?

12 Q. Specifically.

13 A. I'm not aware of one.

14 There certainly was a broader provincial  
15 economy impact assessment, which your probably aware  
16 of. I believe in fact there is some material in here,  
17 but not specifically addressed to North Shore.

18 Q. Okay. Thank you.

19 A. However, I suppose I could add that  
20 in conjunction with the earlier studies that we carried  
21 out in that region of the province in the 1970s, there  
22 were studies, I believe, that included community impact  
23 in terms of employment potential and other aspects of  
24 local community impact.

25 Q. Mr. Johansen, are you referring to

1 studies from 1974 to 1978?

2 A. Yes, I am. Which were documented in  
3 an environmental assessment document. I think it might  
4 have in fact got as far as submission to government,  
5 but it was very shortly thereafter withdrawn because of  
6 load growth falling off, and it had never remained a  
7 submission.

8 I think in fact we have provided a copy  
9 of that documentation to your client.

10 Q. That is true. Mr. Johansen, have you  
11 looked at those studies recently?

12 A. Not recently, no.

13 Q. Would you be comfortable relying upon  
14 those studies to detail the potential regional economic  
15 impacts of a nuclear station on the North Shore of Lake  
16 Huron?

17 A. No, certainly not.

18 Q. All right. In the interrogatory that  
19 we were just looking at there is reference to community  
20 impact studies. And the very last sentence states  
21 that:

22 Detailed community impact studies will  
23 be undertaken as part of the  
24 Environmental Assessments...

25 I presume that at this point in time the

1 reference was to environmental assessment on a new  
2 nuclear station. Would that be correct, Mr. Penn?

3 MR. PENN: A. Well, it is taken that the  
4 question is general and not only includes nuclear but  
5 includes all options.

6 What we are referring to here is the  
7 site-specific project environmental assessment for  
8 CANDU "A", for example, if it had proceeded, would have  
9 included a detailed assessment of all alternative sites  
10 on the basis that this hearing, if we had proceeded  
11 with a request to approve nuclear in the previous time  
12 scale, would have established need for.

13 Q. Mr. Penn, I think you have already  
14 made reference to this but could you confirm for me  
15 that no community impact analysis has been done by  
16 Ontario Hydro for any First Nation in the province with  
17 regard to nuclear?

18 A. Well, we were just starting it, Ms.  
19 Marlatt, and there had been employment profiles started  
20 to be put together and the nature of the infrastructure  
21 that would be necessary if one of the alternatives was  
22 North Channel, and the impact of increasing population  
23 for a temporary period, but it hardly got off the  
24 drawing board.

25 Q. Thank you, Mr. Penn.

1                   The only other community impact analysis  
2     for a First Nation would be perhaps in the area of the  
3     Bruce nuclear plant, the Saugeen First Nation,  
4     approximately 30 minutes from that nuclear plant; is  
5     that your understanding, Mr. Penn?

6                   A. I am aware of the Saugeen Nation. I  
7     don't know unless Mr. Johansen -- if the question is:  
8     Were they consulted at the time that the Bruce "A"  
9     Nuclear power station was in the planning stage, is  
10    that the study?

11                  Q. No, Mr. Penn. Community impact  
12    study, was there a community impact study done on  
13    Saugeen First Nation. That's the question.

14                  A. I don't know personally, I'm sorry.  
15    It's a long time ago.

16                  Q. Okay. Would you undertake to let me  
17    know if there was such an impact study? It's my  
18    understanding that there was not.

19                  THE CHAIRMAN: Were cumulative impact  
20    studies even invented back in those days?

21                  MS. MARLATT: Community impact studies.

22                  THE CHAIRMAN: It's a fairly new term.  
23    They may have called it something else. But cumulative  
24    impacts studies are a new concept, are they not?

25                  MS. MARLATT: Q. Well, Mr. Penn, can you

1 confirm for me that there were community impact studies  
2 done on the communities around Bruce? It's my  
3 understanding that there were.

4 MR. JOHANSEN: A. I certainly can  
5 confirm that. In next with the Bruce "B" and Bruce  
6 heavy water plant expansion projects in the mid-70s,  
7 there were major community impact studies carried out  
8 and incorporated in the environmental assessment  
9 submissions to government, however, I don't recall the  
10 specifics of Aboriginal issue consideration in that.

11 Were you asking us in fact to check on  
12 that?

13 Q. Mr. Johansen, it's my understanding  
14 that there was not a community impact study done on the  
15 Saugeen at that time and you will let me know if there  
16 was.

17 A. So we will get back to you if,  
18 indeed, there was.

19 Q. Yes. If my information is incorrect,  
20 please let me know.

21 THE CHAIRMAN: Do you want an undertaking  
22 number for that?

23 MS. MARLATT: Yes, please.

24 THE REGISTRAR: 532.17.

25



1       ---UNDERTAKING NO. 532.17: Ontario Hydro undertakes to  
2                               provide if there was a community impact  
                              study done on Saugeen First Nation.

3                   MS. MARLATT: Q. Mr. Johansen, looking  
4       at page 102, Exhibit 668, I think we are now going to  
5       start to go into some of the references that you  
6       referred to previously about social environment  
7       criteria. And looking at page --

8                   MR. JOHANSEN: A. Ms. Marlatt, I am  
9       sorry, I was making a note on the undertaking and I  
10      thought I heard 168.

11                  Q. Sorry. We are at page 102.

12                  A. Oh, 102.

13                  Q. If you are at page 168, we would have  
14      a problem with the question, I think.

15                  A. All right, I am with you now.

16                  MS. MARLATT: Mr. Chairman, I am moving  
17      into a new area, would you like me to stop or start?

18                  THE CHAIRMAN: Why don't we stop until  
19      2:30 then. We are adjourned until 2:30.

20                  THE REGISTRAR: Please come to order.  
21      This hearing will adjourn until 2:30.

22      ---Luncheon recess at 12:57 p.m.

23      ---On resuming at 2:36 p.m.

24                  THE REGISTRAR: Please come to order.  
25      This hearing is again in session. Be seated, please.

1 THE CHAIRMAN: Ms. Marlatt.

2 MS. MARLATT: Thank you.

3 Q. Mr. Johansen, I believe that when we  
4 left off before the lunch break we were discussing some  
5 matters in the social impacts area, and I wonder if you  
6 could turn to page 107 of Exhibit 668.

7 MR. JOHANSEN: A. Yes, I have got it.

8 Q. All right. That's page 15-54 of  
9 Exhibit 3, and the chart that is entitled: Examples of  
10 Social Acceptance Considerations has as headings,  
11 Provincially, Regionally and Locally.

12 And, Mr. Johansen, are you familiar with  
13 this chart?

14 A. Familiar... I have seen it before.

15 Q. Okay. Under Regionally it's stated:

16 "People living in certain regions of  
17 Ontario may have a particular interest in  
18 parts of the Demand/Supply Plan. For  
19 example, northern residents may have a  
20 particular interest in the orderly  
21 development of hydraulic stations or the  
22 location of a major supply facility."

23 Would you confirm for me, Mr. Johansen,  
24 that First Nations are not mentioned on this page in  
25 this chart?

1           A. Well, they are certainly not  
2 mentioned there. I will just quickly scan to see --

3           Q. Thank you.

4           A. A quick scan doesn't pick up any  
5 reference to native or Aboriginal interests in this  
6 chart.

7           Q. Okay.

8           MS. HARVIE: Aside of course from the  
9 fact that they are people.

10          MR. JOHANSEN: Yes.

11          MS. MARLATT: Thank you, Ms. Harvie, I  
12 appreciate you pointing that out.

13          Q. Mr. Johansen, under regional social  
14 interests, an example of that may be something like the  
15 North Shore Tribal Council which represents a region of  
16 Ontario's First Nations.

17          Would you accept that, Mr. Johansen?

18          A. Generally, yes. I'm not quite sure,  
19 in my own mind, about the demarcation between regional  
20 and local, that's probably somewhat subjective.

21          And I might just also comment that the  
22 examples given here seem to suggest that in Ontario  
23 Hydro we tend to compartmentalize hydraulic and major  
24 supply facility planning as strictly northern issues.  
25 I don't think that was the intent here.

1                   Certainly we do develop hydraulic  
2 potential in Southern Ontario as well as indeed we site  
3 major projects in southern Ontario.

4                   Q. And would you agree with me, Mr.  
5 Johansen, one of the most effective ways to find out  
6 what the appropriate regional organizations are for  
7 First Nations would be to ask First Nation communities  
8 who they consider their regional representatives to be?

9                   A. That seems logical to me, yes.

10                  Q. Thank you. Would you agree with me,  
11 then --

12                  MR. PENN: A. I'm quite sure, Ms.  
13 Marlatt, that we are fully familiar with the contacts  
14 throughout north of Ontario.

15                  Q. Yes, I would hope so, Mr. Penn. Mr.  
16 Johansen, would you agree with me that information  
17 about provincial and regional social impacts are  
18 relevant to a planning hearing?

19                  MR. JOHANSEN: A. Are relevant, did you  
20 say?

21                  MS. HARVIE: Well, I think that's a legal  
22 question, Mr. Chairman, and is not a proper question to  
23 ask a witness.

24                  MS. MARLATT: Mr. Chairman, I didn't mean  
25 it in a legal concept, I meant it in a planning

1 concept, whether or not these are the types of  
2 information that Mr. Johansen would have considered.

3 THE CHAIRMAN: If you change that to  
4 significant, perhaps Ms. Harvie will let you get away  
5 with it.

6 MS. MARLATT: Q. I'm happy to change it  
7 to significant. Mr. Johansen?

8 MR. JOHANSEN: A. On that  
9 understanding--

10 Q. Yes.

11 A. --I would agree that as planning  
12 studies progress from the early broad-based stage  
13 through to the site-specific stage that there is a  
14 natural progression in the kind of issues and criteria  
15 that are addressed with criteria being broad-based  
16 provincial, if you will, at the outset when the study  
17 area is very large, to more detailed and site-specific  
18 at the project stage.

19 So there is a natural gradation that goes  
20 on there. Although, that's not to say that provincial  
21 and regional issues are not addressed at the local  
22 stage, but there's a change in emphasis that tends to  
23 occur.

24 Q. Yes, Mr. Johansen, but you would  
25 agree with me that on this page as part of Exhibit 3

1 under regional, people living in certain regions of  
2 Ontario may have a particular interest in parts of the  
3 Demand/Supply Plan. So certainly regional interests  
4 regarding social acceptance are considered on this page  
5 as part of the Demand/Supply Plan; correct?

6 A. That's what it says, yes.

7 Q. Thank you. Looking at page 109 of  
8 Exhibit 668, this just let's you know that this is the  
9 Environmental Analysis, which I believe is Exhibit 4,  
10 and I have taken out copies on page 110 of the section  
11 on nuclear options.

12 I should let you know now that most of  
13 the excerpts that I have here are with regard to Case  
14 15.

15 Looking at page 111, which is from page  
16 5-6 of Exhibit 4, in the first column, the very last  
17 sentence states:

18 "Potential socio-economic impacts  
19 will be addressed through community  
20 impact monitoring and impact agreements."

21 And I think this has come up previously,  
22 Mr. Johansen, but would you agree with me that not all  
23 potential socio-economic impacts could be addressed  
24 through a community impact agreement, that there is the  
25 potential that there may be impacts that could not be



1 addressed through that vehicle?

2 A. That may very well be. I don't think  
3 anywhere there is an implication that community impact  
4 monitoring and agreements can, in all cases, compensate  
5 for any and all impacts.

6 Q. All right. I just wanted to confirm  
7 that the sentence was just an example of ways in which  
8 potential socio-economic impacts could be addressed.  
9 Is that correct?

10 A. Yes.

11 Q. Okay. Looking at page 114, the  
12 second column, second heading is lifestyle impacts, and  
13 this is regarding implementation of case 15. The  
14 second paragraph of that column states:

15 "The lifestyle of residents in  
16 smaller, more remote communities is  
17 likely to change. These changes will  
18 result from the influx of new residents,  
19 changing employment patterns (ie.  
20 construction employment versus  
21 traditional occupations), increased  
22 availability of goods and services, and  
23 changing municipal services. These  
24 changes can be positive or negative and  
25 will be particularly significant for

1 Native people with a traditional way of  
2 life."

3 Now, I should note that the paragraph  
4 just prior to that does make reference to people living  
5 in the vicinity of nuclear facilities and those who may  
6 be concerned about nuclear safety.

7 Would you agree with me, Mr. Johansen,  
8 that the term significant in the last line is not  
9 described in any other place in this environmental  
10 assessment, what the types of significant impacts would  
11 be on native people?

12 A. It may not be defined specifically in  
13 terms of native people. I don't recall but I believe  
14 that there are -- again, I suppose - I'm not trying to  
15 say that there is a very definitive statement anywhere  
16 that says these are significant impacts, these are not  
17 significant impacts - it is an area involving a lot of  
18 subjective and objective evaluation and good judgment  
19 on the part of the professionals in this field in  
20 consultation with those who are likely to experience  
21 the impacts and who are concerned about that.

22 But I believe you are correct in  
23 observing that there is nothing that defines this  
24 significant impact for native peoples, specifically.

25 Q. Would you agree with me, Mr.

1       Johansen, that asking First Nations about what they  
2       consider significant impacts to be would be a good  
3       start in determining what that term significant meant  
4       to them?

5                   A. That seems logical to me, yes.

6                   Q. Thank you.

7                   A. I believe, had the program which was  
8       halted at the time of the nuclear moratorium  
9       announcement continued, there would have been effort in  
10      that regard.

11                  Q. Okay. And that would have been at a  
12      site level; correct?

13                  A. Yes.

14                  Q. Okay. Turning to page --

15                  A. Or region level, I should say.

16                  Q. Okay. No, but it would have been  
17      with regards to a site-specific environmental  
18      assessment?

19                  A. Well, it would have begun --

20                  Q. That is what those -- the purpose --

21                  A. Well, it would have begun with  
22      reference to a region within which a specific site  
23      might eventually be selected.

24                  Q. Mr. Penn, do you have anything to add  
25      to that?

1 MR. PENN: A. No. I was just going to  
2 point out that we would need to select and acquire the  
3 land and gain approval for that, and that would be the  
4 period of time that would first provide that  
5 opportunity.

6 Q. All right. And that was a separate  
7 procedure to the procedures for the Demand/Supply Plan;  
8 correct, it was occurring at the same time?

9 A. It would be parallel with the  
10 site-specific project environmental assessment and that  
11 process, as I mentioned this morning, had started.

12 Q. Thank you. Mr. Johansen, turning to  
13 page 115 which is page 5-30 of the same exhibit, I  
14 would like you to look at the heading, distribution of  
15 risks and benefits, the second sentence starts:

16 "Those who perceive that they are  
17 exposed to risks at any stage of the fuel  
18 cycle or from transportation, but who do  
19 not receive a compensating benefit, may  
20 consider the situation inequitable."

21 Okay. Mr. Johansen, would you agree with  
22 me that this statement acknowledges that there may be  
23 existing perceptions of inequality from the nuclear  
24 fuel cycle in Ontario?

25 MR. JOHANSEN: A. I believe it

1 recognizes the possibility that that may be the case,  
2 but it's a conditional statement, I don't think it's a  
3 definitive assessment based on any particular  
4 situation.

5 Q. No, I'm asking --

6 A. But it certainly does recognize that  
7 there will inevitably be sectors of the population  
8 where there is not a perfect balance, and there will be  
9 other areas of the population where there is an over  
10 balance, if you will, and somewhere in the middle there  
11 will be a good balance.

12 But that's inevitable in the community  
13 impact management program involving compensation and  
14 services. I mean, it's not all financial compensation  
15 but services, and these are part of the approach that  
16 Ontario Hydro normally employs to try to reconcile the  
17 difference between the obvious benefits and the  
18 disadvantages.

19 Q. Mr. Johansen, distribution of risks  
20 and benefits is a criteria listed in the Demand/Supply  
21 Plan as part of determining social impacts,  
22 socio-economic impacts; is that correct? Is that your  
23 understanding?

24 A. My understanding is, at least as it's  
25 presented here, it's in the context of determining

1 social acceptance.

2 Q. Excuse me for a minute.

3 A. But clearly the two are  
4 interconnected.

5 Q. I would like to refer you back to  
6 page 101. And the answer to that interrogatory talks  
7 about a set of social criteria were  
8 developed by which social acceptance was measured,  
9 those criteria include..., and in that list is  
10 distribution of risks and benefits. That's what I was  
11 referring to, Mr. Johansen.

12 A. Yes. But I don't think that is  
13 different from what I said. That to me this indicates  
14 that these are all factors involved in the  
15 determination of social acceptance.

16 Q. All right. Mr. Johansen, my question  
17 is only that: Would you agree that in the nuclear  
18 presentation of social acceptance, distribution of  
19 risks and benefits is considered one of the criteria to  
20 be considered and that under that criteria is listed  
21 possible inequalities regarding the existing impact of  
22 the nuclear cycle in Ontario?

23 A. That's fair.

24 Q. I would like to refer you to page  
25 118.



1 MR. PENN: A. Before we leave that last  
2 point, I would like to point out that the sentence  
3 says:

4 "Those who perceive that..."

5 It doesn't acknowledge that they are  
6 necessarily subject to whatever the risk and benefit  
7 is.

8 So it's a statement of general  
9 recognition that peoples' concerns over risks and  
10 peoples' ability to gain benefits should be addressed.

11 Q. All right. Mr. Penn, on an objective  
12 level would you agree that an objective search of  
13 Ontario determining whether or not there is an  
14 inequitable distribution of risks and benefits with  
15 regards to nuclear fuel cycle is possible at an  
16 objective level, you can do that?

17 A. I don't think I am understanding your  
18 question.

19 Q. Okay. Ontario Hydro could choose to  
20 turn its attention to, as it has, the issue of  
21 distribution of risks and benefits, and one of the  
22 principles that they talk about -- or you talk about is  
23 the idea of the nuclear fuel cycle and the existing  
24 impacts that it has right now today on certain regions  
25 of Ontario.

1                   And you could do an objective -- from  
2           your viewpoint, an objective search of Ontario and  
3           determine whether or not there are certain regions that  
4           right now today experience inequitable distribution of  
5           risks and benefits because of the nuclear fuel cycle.

6                   I am not asking you to agree with me  
7           whether or not there are such regions, I am asking you  
8           to agree with me that that's a principle that you look  
9           at, objectively.

10                  A. I would agree on the basis, of  
11           course, that this plan is referring to future plant.

12                  Q. All right. Would you agree with me,  
13           Mr. Penn, that from a subjective interpretation that it  
14           is also possible that Ontario Hydro could ask the  
15           citizens of Ontario, within their regions, whether or  
16           not they consider subjectively that they have an  
17           inequitable distribution of risks and benefits from the  
18           nuclear fuel cycle; correct, that's possible?

19                  A. Well, it's possible and the  
20           information centres that we have had we have invited  
21           people to talk about those types of issues over which  
22           Hydro has control.

23                  Q. And from a subjective point of view  
24           it would not be part of your planning process to  
25           consider whether or not there was inequitable

1 distribution of risks and benefits not by Ontario  
2 Hydro?

3 MS. HARVIE: Mr. Chairman, if I may just  
4 interject at this point and remind the panel and Ms.  
5 Marlatt that Dr. Tennyson will be appearing on Panel 10  
6 for the purpose of explaining the methodology to you  
7 that was employed in preparing the environmental  
8 analysis, and specifically this section here,  
9 distribution of risks and benefits, and I just wish to  
10 bring to your attention that she is the person with the  
11 expertise to speak to this matter.

12 THE CHAIRMAN: Thank you very much. But  
13 Mr. Penn, as the author of his own misfortune as far as  
14 this is concerned because he volunteered the statement,  
15 therefore, once he makes the statement, I think she can  
16 cross-examine him on it.

17 MS. HARVIE: Well, I would only point out  
18 that personally I don't understand the difference  
19 between objective and subjective and I assume that the  
20 witnesses understand the difference.

21 THE CHAIRMAN: I think you share a lot of  
22 good company in that area.

23 MS. MARLATT: Q. Mr. Penn, it was your  
24 observation that there was an objective and subjective  
25 difference between this area?

1 MR. PENN: A. The only observation I  
2 made that started this discussion was that I pointed  
3 out that the sentence started with the words "those who  
4 perceive that", and to me that means that the matter  
5 may or may not be a fact, that is all.

6 Q. And, Mr. Penn, would you agree with  
7 me that it's possible to ascertain whether or not  
8 Ontario Hydro would agree whether or not it's a fact;  
9 all you would have to do is look into why the residents  
10 of a certain region felt that way; correct?

11 A. And we make - and we really are  
12 talking about planning issues now - I think we make  
13 every effort in my experience and view to consult and  
14 discuss issues over which Hydro has direct  
15 responsibility and control.

16 Q. And from a planning perspective, you  
17 do not consider it relevant to look at issues over  
18 which Ontario Hydro does not have control but that  
19 affect the present environment of Ontario?  
20 [3:00 p.m.]

21 A. Well, I personally may have ethical  
22 thoughts on all these matters, but I don't think it's  
23 appropriate for Hydro to be involved in other people's  
24 business, for example.

25 Q. Thank you, Mr. Penn.

1 Mr. Johansen, looking at page 118,  
2 Exhibit 50, the title of this document - it's Exhibit  
3 50, Ontario Hydro filed that exhibit - Concerning  
4 Meeting Future Energy Needs, Draft Demand/Supply  
5 Planning Strategy Reference Report, Analysis of  
6 Representative Plans, Social and Community Impacts.

7 Mr. Johansen, could you give me an idea  
8 of what you consider impacts to be?

9 Perhaps I will direct you further.

10 THE CHAIRMAN: You mean social and  
11 community impacts?

12 MS. MARLATT: Yes, that's correct.

13 Q. Perhaps we should go on to the next  
14 page and I will ask you what I am after.

15 If you look table 2.1, comparison of all  
16 supply plans, the heading there says Evaluation  
17 Criteria, and lists the criteria that we have just been  
18 discussing, regional development, employment, community  
19 impacts, special interests, lifestyle, distributive,  
20 which I assume means risks and benefits, the same  
21 criteria.

22 Those are criteria, correct? Those are  
23 not impacts?

24 Would you agree with me that the  
25 headings --

1 MR. JOHANSEN: A. The heading clearly  
2 intends that they be used as criteria.

3 Q. And looking at the first line,  
4 community impacts, it says three sites with large  
5 impact potential. Would you agree with me that that is  
6 not an impact? It does not identify what the impact  
7 is?

8 A. I would tend to agree with you that  
9 it seems to be a judgment as to the general comparative  
10 impact of the AS nuclear plan alternative as compared  
11 to others, which I believe was the general intent of  
12 this exercise.

13 Q. But there is no indication of what  
14 the term "impact" means, that I can tell, Mr. Johansen.  
15 Is there?

16 A. On this table I can't see one, but  
17 after all, this is just one table extracted from a  
18 document which I believe was 50 or more pages thick.

19 Q. That is correct. And I would like to  
20 look at some of the other items in that document.

21 Looking at page 120, appendix 1, Social  
22 and Community Impacts - Commentary on Alternative Plan  
23 Components.

24 This is what you were referring to;  
25 correct?



1                   A. In general. I wasn't thinking  
2 exactly of this. I mean, I am not intimately familiar  
3 with this document, although obviously I have referred  
4 to it several times this morning. But I didn't have  
5 anything to do with writing it.

6                   Q. Did anyone on the panel, in case  
7 there is someone more qualified to answer my questions?

8                   All right, Mr. Johansen, under the  
9 heading 4.0 Special Interest Impacts. Would you agree  
10 with me that First Nation communities would normally be  
11 discussed under special interest impacts, Mr. Johansen?

12                  THE CHAIRMAN: The list doesn't seem to  
13 be structured for people. 4.1 is various supply  
14 options.

15                  MS. MARLATT: Well, actually that was  
16 part of my next question. I will just skip to it.

17                  THE CHAIRMAN: I don't think the author  
18 intended that people be part of, at least, 4.1.

19                  MS. MARLATT: All right.

20                  Q. Mr. Johansen, looking at nuclear  
21 fossil components, let's take a look at that first  
22 paragraph:

23                         The introduction of major projects in  
24 locations that require expansion of the  
25 bulk transmission system will affect

1 agricultural and recreational interests.

2 If reliance on nuclear capacity advances  
3 the need for nuclear waste facilities,  
4 potentially affected communities may  
5 perceive adverse impacts. Expansion of  
6 all aspects of the nuclear fuel cycle may  
7 increase concerns regarding environmental  
8 and health and safety effects.

9 What I am reading there is that there is  
10 slight discussion of natural environment, in referring  
11 to agricultural and recreational interests, that in  
12 referring to potentially affected communities there is  
13 a reference to social impacts. Would you agree with  
14 me, Mr. Johansen?

15 MR. JOHANSEN: A. Well, I have  
16 difficulty really putting of all of this into  
17 perspective without reading the document from beginning  
18 to end.

19 I know from working with social  
20 scientists on these sort of matters in the past, that  
21 the word "special impact" is sometimes used to  
22 differentiate between conventional social or community  
23 impacts as would generally be experienced in the case  
24 of any large industrial project, as opposed to a  
25 nuclear project or other hazardous or perceived

1 hazardous industrial activity where health and safety  
2 concern is a particular concern. And social impact  
3 assessors sometimes differentiate between conventional  
4 and those sort of special impacts in that way, and I  
5 really can't tell by looking at this whether that was  
6 the intent here.

7 Q. All right. Mr. Johansen, you have  
8 reviewed this document previously; is that correct, in  
9 its entirety?

10 A. Your materials document?

11 Q. No, your materials, Exhibit 50?

12 A. Exhibit 50, yes, but it was dated  
13 1987 so it's been a while since I have done a careful  
14 reading of it.

15 Q. Thank you. Looking at the next page,  
16 page 122, I would just like you to conform for me that  
17 under Lifestyle Impacts there is no heading for  
18 nuclear. I see a heading for demand management  
19 component and hydraulic component but not for nuclear  
20 component. Could you confirm that?

21 A. I can confirm that, yes.

22 Q. Thank you.

23 A. However, I might add that in any  
24 specific project, impact assessment, lifestyle, is  
25 often in my experience, a specific factor that's

1 addressed. So I don't think the absence of lifestyle  
2 impacts in this particular very generic strategy level  
3 document means that lifestyle impacts are not  
4 considered significant in nuclear project assessments,  
5 for instance, or other major project assessments.

6 Q. This report is a reference report for  
7 the demand/supply planning strategy; correct?

8 A. Yes.

9 Q. It not a report for a site level  
10 environmental assessment?

11 A. Correct.

12 Q. So, whoever drafted the report did it  
13 with the demand/supply planning strategy in mind. That  
14 was the purpose of it, it was analysis of  
15 representative plans, social and community impacts;  
16 correct?

17 MS. HARVIE: I think that is a matter of  
18 evidence that's been canvassed quite extensively, Mr.  
19 Chairman, on Panel 6, and Ms. Marlatt had ample  
20 opportunity to ask Ms. Quinn those questions that the  
21 time.

22 MS. MARLATT: Again, Mr. Chairman, I am  
23 asking a very specific question about nuclear here.  
24 Nuclear listed or not listed under lifestyle impacts.

25 MS. HARVIE: The witness has given the

1 answer to the best of his ability, he stated that on  
2 the page concerned the word "nuclear" does not appear  
3 under lifestyle impacts. He has also stated that he  
4 did not write the document, he has not reviewed  
5 recently, and obviously he can't provide any  
6 assistance, I would submit, on the intent of the  
7 authors who have been before you and will be appearing  
8 before you on Panel 10.

9 THE CHAIRMAN: Surely the document speaks  
10 for itself, doesn't it, Ms. Marlatt.

11 MS. MARLATT: I am content to take that  
12 as answer.

13 THE CHAIRMAN: I notice, by the way, that  
14 there is a separate section which isn't in your  
15 material entitled Community Impacts of Projects and  
16 Programs, which is 3.0.

17 MS. MARLATT: I was looking specifically  
18 at the lifestyle impacts and the fact that it referred  
19 to --

20 THE CHAIRMAN: How the author  
21 distinguishes between community impacts and lifestyle  
22 is very difficult to know. It would be very - I hate  
23 to use the word - subjective to the author, perhaps.

24 MS. MARLATT: Perhaps these would be  
25 questions best dealt with on Panel 10.

1 THE CHAIRMAN: Yes.

2 MS. MARLATT: Q. Mr. Penn, on page 124  
3 of my materials, which is the excerpt from Volume 126,  
4 page 22261. You note at line 11:

5 "You certainly take risk with doing  
6 nothing and not providing future growth  
7 in electrical generation, in my view, can  
8 lead to reduced economic and higher  
9 social risk."

10 I think this was preceded, if I recall  
11 correctly, by a discussion about the issues of whether  
12 or not you should build future stations. You were  
13 answering that, to begin with line 7:

14 "I certainly agree with the first  
15 sentence that no human activity can  
16 absolutely be risk free whether in  
17 operation or subsequent management of  
18 inevitable waste."

19 What I was curious about your answer  
20 there, Mr. Penn, can you tell me whether or not you  
21 were thinking about the issue of over-building versus  
22 under-building?

23 MR. PENN: A. Well, I can't tell you  
24 without getting Volume 126 out, because we seem to be  
25 addressing issues of risk. You may very well be right.



1 I remember that we did discuss the  
2 virtues of over-building or under-building at one time  
3 with Mr. Hamer. I would be happy to get it out and  
4 confirm that if you want.

5 Q. I was specifically wondering about  
6 the terms economic and higher social risk. You are  
7 speaking there about economic risk, I assume, from the  
8 viewpoint of Ontario Hydro; is that correct, and not  
9 from, as we discussed previously, economic impacts on,  
10 say, regions from over-building?

11 A. Well, I think what I had in mind was  
12 that if you did nothing at all and didn't provide for  
13 any likely future growth in the demand for electricity,  
14 in the province as a whole, then it would necessarily  
15 lead to reduced economy in the province - that's what I  
16 meant to imply - and, consequentially, higher social  
17 risk.

18 It was a philosophical statement of the  
19 impact of not providing a basic energy source.

20 Q. That was my next question, Mr. Penn.  
21 It's your personal opinion?

22 A. Yes.

23 Q. And it is not based upon your  
24 expertise in the area of, say, economic impacts on  
25 regions or social impacts, is that correct?

1                   A. No, it's based upon my 37 years  
2 experience in the utility business.

3                   Q. But as we discussed, those 37 years  
4 why were not spent in the field of social impact  
5 assessment; correct?

6                   A. No, it's based upon hopefully a  
7 person who is reasonably intelligent.

8                   Q. Mr. Johansen, moving into the area of  
9 natural environment, I would like to refer you to page  
10 130, Interrogatory 9.36.2.

11                   THE REGISTRAR: .156.

12                   ---EXHIBIT NO. 520.156: Interrogatory No. 9.36.2.

13                   MS. MARLATT: Q. This was an  
14 interrogatory requesting information:

15                   For each mine which presently supplies  
16 Ontario Hydro's fossil and nuclear  
17 stations with fuel, please state in  
18 hectares the actual land area occupied by  
19 their operation, openpit or otherwise,  
20 and their tailings ponds, slag or  
21 tailings piles, as a result of the mining  
22 operation itself or processing of the  
23 fuel.

24                   The response is: Ontario Hydro does not  
25 have this information.

1                   Would you confirm, for me, Mr. Johansen,  
2           that's correct?

3                   MR. JOHANSEN: A. I didn't write this  
4           answer, and I am not aware that we have such specific  
5           information.

6                   I can say, however, that in table A-1, of  
7           Exhibit 4, we provided unit values in terms of hectares  
8           or acres, I forget which, per unit of energy, and we  
9           have provided similar, slightly more detailed  
10          information in the appendix to Exhibit 507.

11                  Q. Have you done a land use study, say,  
12          on the North Shore and taken a look at what the land  
13          use presently is there with regards to mining, milling  
14          and reprocessing operations, to your knowledge?

15                  A. All that I am aware of that we have  
16          done in the past, is what is documented in the North  
17          Channel site selection environmental assessment  
18          documentation which we have provided to you, and I am  
19          aware that a similar siting assessment program was  
20          under way but halted because of the moratorium. Apart  
21          from that, I am not aware of any actual documentation  
22          or plans to study such factors.

23                  Q. Okay.

24                  THE CHAIRMAN: Mr. Johansen, you referred  
25          to a table in Exhibit 4, is that right? Did I hear you

1 say that?

2 MR. JOHANSEN: Yes.

3 THE CHAIRMAN: What table was that?

4 MR. JOHANSEN: A-1.

5 THE CHAIRMAN: A-1, thank you.

6 MS. MARLATT: Q. Mr. Johansen, with the  
7 exception of the two things you just spoke about, the  
8 studies in the 70s and the studies that began in 90s  
9 that were with regards to a site environmental  
10 assessment, do you have any data that you are aware of  
11 that Ontario Hydro is putting forward on the potential  
12 impacts of locating a nuclear plant in the North  
13 Channel area on fish and wildlife resources that would  
14 be important to aboriginal interests?

15 MR. JOHANSEN: A. Well, that is exactly  
16 what the North Channel siting assessment documentation  
17 was about. It indicated the very broad based study  
18 from one end of that study area to the other, and  
19 indicated the land uses and natural environment and  
20 human environment features of that area as background  
21 for the recommendation of a specific site within that  
22 area.

23 Q. Mr. Johansen, would you consider that  
24 data that was developed in the mid-70s to be something  
25 you would rely upon today to evaluate impacts on the

1 natural environment on the North Channel?

2 A. No. I said before that we are not  
3 relying on it. We are using it as background  
4 information and as we have testified previously, a  
5 major siting and assessment program was under way which  
6 would have updated all that have information, but it  
7 never got very far off the drawing board, as Mr. Penn  
8 said.

9 Q. It would have updated the  
10 information, but it would have also changed  
11 information, would it not--

12 A. Oh, certainly.

13 Q. --because it would have involved,  
14 theoretically First Nation co-planning.

15 A. For example, that's reasonable.

16 Q. Looking at page 131, which is  
17 Interrogatory No. 9.4.29.

18 THE REGISTRAR: .157?

19 ---EXHIBIT NO. 520.157: Interrogatory No. 9.4.29.

20 MS. MARLATT: Q. There is a question I  
21 have about the response here, and the response is with  
22 regards to the potential effect of uranium fuel. The  
23 response states that:

24 Raw materials, including energy  
25 resources, are an integral part of the

1 physical/natural environment. Their  
2 extraction, distribution and use or  
3 consumption can have effects (positive as  
4 well as negative) on other aspects of the  
5 natural environment and on the human  
6 environment.

7 Now, stopping there, Mr. Johansen, with  
8 respect to the natural environment, could you detail  
9 for me what potential positive effects that the  
10 extraction, distribution and use or consumption of  
11 uranium has on the natural environment?

12 A. Well, first of all, I am not sure  
13 that the respondent in this case intended the  
14 paranthetical expression "positive as well as negative"  
15 to apply to each and every aspect, natural and human  
16 environment that follows in that sentence.

17 [3:17 p.m.]

18 But I believe that we have experience in  
19 carrying out studies on potential impacts in connection  
20 with existing projects, we have experience that the  
21 mere investigation of the environment has led to the  
22 identification of natural hazard areas or areas where  
23 natural instabilities exist, and I believe there have  
24 been examples of where the implementation of the  
25 project entailed some improvements to that natural



1 feature that enhanced its viability. I'm thinking of  
2 marshlands or woodlots, things of that sort.

3 But I don't believe it was the intent  
4 here to suggest that these activities necessarily  
5 result in a lot of positive impacts to the natural  
6 environment.

7 Q. Mr. Johansen, could you provide me  
8 with any information with respect to extraction,  
9 distribution, use or consumption of uranium that has  
10 resulted in a positive impact on the natural  
11 environment?

12 MS. HARVIE: Well I think, Mr. Chairman,  
13 the witness has just attempted to answer that question  
14 to the best of his ability.

15 MS. MARLATT: And I believe he did, but  
16 he referred in his answer to having seen some  
17 information about these types of impacts.

18 MR. JOHANSEN: I was referring to Ontario  
19 Hydro's experience. We have no experience in  
20 developing uranium mining projects and it was a  
21 preamble to -- in the context of raw materials in  
22 general.

23 MS. MARLATT: Q. Okay.

24 MR. JOHANSEN: A. I'm not aware of any  
25 such examples but, on the other hand, I'm not saying

1 that there aren't any, I simply can't think of any on  
2 the spot here.

3 Q. And if any come to your mind, would  
4 you bring that material to my attention?

5 A. Fair enough.

6 Q. Thank you. Page 132, interrogatory  
7 9.6.97.

8 THE REGISTRAR: .158.

9 ---EXHIBIT NO. 520.158: Interrogatory No. 9.6.97.

10 MS. MARLATT: Q. The question is:

11 "What wildlife areas, wetlands, rare  
12 and endangerment species, and other  
13 protected or sensitive populations and  
14 areas have been affected by past and  
15 current nuclear fuel cycle activities?  
16 Please describe the type of plants and  
17 animal species, as well as the number  
18 impacted and size of their overall  
19 populations in Ontario."

20 The response is:

21 "Ontario Hydro has not undertaken  
22 any such studies for the reactor fuel  
23 cycle as a whole."

24 Would you confirm that response, Mr.  
25 Johansen; is that your understanding?

1 MR. JOHANSEN: A. Yes. And I think the  
2 key part of the sentence is that last part, as a whole.  
3 Exhibit 507, I believe, is one of the few attempts that  
4 we have made to look at the entire fuel cycle.

5 Q. Okay, thank you.

6 A. And these matters are addressed in  
7 general terms only.

8 Q. All right, thank you. I was just  
9 about to refer to that, that's page 134, this is  
10 Exhibit 507.

11 Just to clarify the terms, Mr. Johansen,  
12 Materials Relating to Environmental & Health Effects of  
13 Nuclear Generation, the term environmental in that  
14 heading, Mr. Johansen, I take it that Ontario Hydro  
15 meant natural environment?

16 A. Yes, that is fair. I believe what  
17 you are -- what's behind that question is the fact that  
18 in this province certainly the word environment is  
19 defined in the Environmental Assessment Act as  
20 including social and community cultural aspects.

21 I believe, if memory serves me, there was  
22 or is a statement somewhere in the introduction to  
23 Exhibit 507 that clarifies that social and community  
24 aspects are not dealt with. So there is no intent to  
25 address social or human impacts in this document.

1 Q. With the exception of health?

2 A. Yes.

3 Q. All right. Looking at page 135, and  
4 this is the heading 4.0, Impacts On The Natural  
5 Environment. Again, I would like to ask you about a  
6 term that's used here. The second paragraph states:

7 "Appendix 1 summarizes some  
8 potential environmental impacts and  
9 employed mitigation measures throughout  
10 the nuclear fuel cycle..."

11 Looking at the word impacts again there,  
12 we are sent to look at appendix 1. Now, I could only  
13 find a table 1. Is that intended to be appendix 1,  
14 page 138 of our materials?

15 A. I'm quite sure that is what is  
16 referred to. At the bottom there is a note--

17 Q. Thank you.

18 A. --AP 1-1. I think the implication is  
19 that this is table 1 in appendix 1, so a bit of an  
20 editorial inconsistency there, I agree.

21 Q. Okay. I wasn't overly concerned  
22 about that, what I was concerned about is that we are  
23 sent to this table to look at some potential  
24 environmental impacts.

25 Now, going to that table, we see the

1 headings on the first column, potential environmental  
2 effects, air quality, dust, and the heading equipment,  
3 and then the heading mining.

4 Would you agree with me, Mr. Johansen,  
5 that none of those items are impacts, they are  
6 characteristics or activities resulting from uranium  
7 mining or milling. Would you agree?

8 A. Well, those headings which you read  
9 out are categories in my interpretation.

10 Q. Okay.

11 A. The word effects or effect,  
12 environmental effect is what is used at the top of the  
13 table, and in the environmental effect or impact  
14 assessment field there is some judgment required which  
15 tends to be or relies on site-specific knowledge as to  
16 whether that effect is a significant impact or not.

17 Q. Okay. Looking just --

18 A. So the words are used somewhat  
19 loosely here, I would acknowledge.

20 Q. Okay. So looking at that first  
21 column under air quality, I don't see any impacts. Can  
22 you please correct me if you see any impacts listed  
23 there?

24 THE CHAIRMAN: Well, you don't  
25 consider -- just a moment. You don't consider noise

1 from equipment to be an impact?

2 MS. MARLATT: Well, what I would have  
3 asked Mr. Johansen is, what would have been the result  
4 of noise from equipment.

5 For example, would the noise have  
6 resulted in disruption of migration habits of deer.  
7 That to me would have been an impact.

8 THE CHAIRMAN: I see.

9 MS. MARLATT: That's my understanding of  
10 how the term is used.

11 THE CHAIRMAN: Okay.

12 MS. HARVIE: Well, actually, if I could  
13 just draw to your attention one thing. The reference  
14 is to appendix 1 and appendix 1 consists of not just  
15 table 1 but a number of tables and you will find  
16 scattered throughout those tables reference to impacts.

17 MS. MARLATT: We will go to those tables.

18 MS. HARVIE: Well, I just thought it  
19 should be placed on the record that the  
20 cross-examination was perhaps a little misleading in  
21 the sense that there was no discussion of impacts.  
22 There is, in appendix 1.

23 MS. MARLATT: My understanding of the  
24 reference to appendix 1 - please correct me if I'm  
25 wrong, Mr. Johansen - appendix 1 is table 1?



1 MR. JOHANSEN: A. No.

2 Q. No?

3 A. Table 1 is the first part of appendix

4 1.

5 Q. Correct. And table 2 is the second  
6 part?

7 A. Yes.

8 MR. PENN: A. And table 3.

9 Q. Right, okay.

10 MR. JOHANSEN: A. Table 3. The key  
11 really to it is the page numbering at the bottom which  
12 I was trying to explain before.

13 Q. Well, let's go to table 2, then.  
14 Table 2, potential environmental effects, air quality,  
15 again we see dust, equipment exhaust and other. Listed  
16 under other are particulate emissions, odour and noise.  
17 On this page, Mr. Johansen, do you see any impacts?

18 MR. JOHANSEN: A. Well, as I tried to  
19 explain before, the assessment of what you and I could  
20 agree are actual impacts on a specific area of the  
21 environment, that is not in here, and that is difficult  
22 in fact, in my view impossible to do at the planning  
23 stage.

24 So perhaps I would acknowledge that the  
25 word environmental effects or environmental impact is

1 not precisely used in this context, but the intent is  
2 to show aspects of the development and construction and  
3 operation and decommissioning of projects involved at  
4 various stages of the fuel cycle in terms of measures  
5 that are readily quantifiable such as dust and  
6 effluents and emissions that are not so site-specific.

7 MS. MARLATT: Mr. Chairman, would you  
8 like to take the afternoon break now?

9 THE CHAIRMAN: This is a very  
10 extensive -- for instance, you have mentioned to me a  
11 moment ago about the impact on wildlife. AP 1-7  
12 there's a heading, fish and wildlife and then there is  
13 a list of things and then vegetation and there is a  
14 list of things there as well. So it's a fairly  
15 comprehensive appendix.

16 MS. MARLATT: That's precisely where we  
17 were going next, Mr. Chairman.

18 THE CHAIRMAN: All right. We will take  
19 the break now then. Thank you.

20 THE REGISTRAR: Please come to order.  
21 This hearing will take a 15-minute break.

22 ---Recess at 3:30 p.m.

23 ---On resuming at 3:50 p.m.

24 THE REGISTRAR: Please come to order.  
25 This hearing is again in session. Be seated, please.

1 MS. MARLATT: Q. Mr. Johansen, to start  
2 off where we left off just before the break, I would  
3 like to bring you back to the sentence that we saw on  
4 page 135 of the materials, and the second paragraph  
5 where it states:

6 "Appendix 1 summarizes some  
7 potential environmental impacts and  
8 employed mitigation measures throughout  
9 the nuclear fuel cycle from fuel  
10 extraction to station decommissioning and  
11 used fuel..." cycle.

12 THE CHAIRMAN: Used fuel disposal.

13 MS. MARLATT: Q. Sorry, "...disposal."

14 Mr. Johansen, I would like to focus our  
15 discussion on the fuel extraction, all right. So we  
16 turn to appendix 1, table 1 which tells us the  
17 potential environmental effects of uranium mining,  
18 milling and fuel fabrication and standard mitigation  
19 measures; correct?

20 MR. JOHANSEN: A. Yes, that's what it  
21 says.

22 Q. So that's what the purpose of that  
23 table 1 is, to discuss the environmental effects of  
24 uranium mining, milling and fuel fabrication. And when  
25 we reviewed that table, just before the break, you

1       agreed with me, I think, that there were no impacts  
2       listed on this specific table; is that correct?

3               A. Well, I agreed that there was not and  
4       could not be in this table any assessment of specific  
5       impacts as commonly understood in the environmental  
6       assessment field, impacts normally being understood to  
7       be very site-specific, related to specific locations.

8               What this table presents are a number of  
9       readily quantifiable measures or indicators of effects  
10      or impacts.

11              Q. All right. So dealing with the  
12      second part of your answer, this table lists for us  
13      measures?

14              A. Yes.

15              Q. Or criteria that can be looked at;  
16      correct?

17              A. I'm not sure about the criteria part  
18      of your question, but measures I think is a more  
19      neutral --

20              Q. All right. Now, if we continue  
21      through appendix 1, we encounter table 2. The purpose  
22      of table 2 appears to me to be to describe the  
23      potential environmental effect of nuclear station  
24      construction and standard mitigation measures; correct?

25              A. Yes, in the same sort of context.

1 Q. All right. So it is distinct from  
2 table 1?

3 A. Yes.

4 Q. Thank you. The information in table  
5 2, such as, and I will take you to, the page that I  
6 believe Mr. Chairman mentioned before the break, page  
7 1-5 or 144 of my materials, it lists fish and wildlife,  
8 vegetation and there's reference to loss of habitat,  
9 mortality and disturbance.

10 Those effects are specific to the  
11 operation of a nuclear station; correct, or the  
12 construction of a nuclear station, sorry?

13 A. That is the intent, yes.

14 Q. They are not related to table 1 which  
15 is uranium mining, milling and fuel fabrication;  
16 correct?

17 A. Well, as presented here they are not  
18 intended to be. However, I might add a comment, that  
19 that doesn't suggest that such factors would not be  
20 looked at if one were indeed to do a complete detailed  
21 assessment of a uranium mining project, for example.

22 Q. All right.

23 A. I guess a second comment I could add,  
24 which I believe is consistent with what I have said  
25 before, we are not as familiar with the front end of

1 the fuel cycle.

2 We have attempted, in this document, to  
3 present information on that part of the fuel cycle to  
4 present a fairly complete picture for context purposes,  
5 but clearly the level of detail that we are able to  
6 present on the front end of fuel cycle is not as great  
7 as for that part of the fuel cycle that we have years  
8 of experience in.

9 Q. Okay. Mr. Johansen, with table 2,  
10 you did not provide any representative data for any of  
11 these items such as loss of habitat; correct, you just  
12 listed them as potential effects.

13 A. Yes, I think you are correct there.

14 Q. Okay.

15 A. Data such as in table A-1 you mean?

16 Q. Yes.

17 A. Yes. And while I have got the  
18 microphone and before I forget, you asked me earlier  
19 about examples of positive impacts on the natural  
20 environment of uranium extraction and distribution and  
21 end use, and I suppose I should have thought of it  
22 right off, but I will just mention an example right  
23 now, and it's fairly obvious, that the extraction of  
24 uranium and use in nuclear power generation obviously  
25 displaces acid gas emissions and CO(2) emissions and so



1 on, which I think we could agree are benefits to the  
2 natural environment.

3 Q. I don't know --

4 A. Without overlooking the fact that  
5 there are other aspects to that equation, but which  
6 have to be considered.

7 Q. And you would have to wonder, Mr.  
8 Johansen, about double counting; correct? You wouldn't  
9 want to perhaps allocate that as one of the benefits of  
10 the operation of a nuclear station in your mind, but  
11 that is not a direct benefit to the natural environment  
12 from the mining operation, the area that is mined does  
13 not directly benefit from that?

14 A. Directly, that is subjective, I  
15 guess. It might be, but I'm not trying to really make  
16 this complicated.

17 Q. Okay.

18 A. I think it's a fair example.

19 Q. Okay. Mr. Johansen, just to be  
20 completely fair to you about this appendix 1, I want to  
21 list for you, they are not in my materials, but the  
22 other tables, the headings of the other tables.

23 Table 3 is a summary of environmental  
24 effects during station operation, table 4 is a  
25 potential non-radiological effects of decommissioning,

1 and that's it for appendix 1.

2 A. I'm getting there.

3 Q. Okay.

4 A. Yes.

5 Q. Thank you. Those tables do not  
6 discuss milling, mining, processing; correct?

7 A. I would have to go back and check  
8 again.

9 Q. Okay.

10 A. I thought there was -- well, on page  
11 AP 1-2, for example, this would be table 1.

12 Q. Mr. Johansen, we started with table  
13 1. I think we agreed that was the purpose of table 1.

14 THE CHAIRMAN: I thought you just asked  
15 him -- you said appendix didn't talk about milling and  
16 mining, and I thought that was what he answered.

17 MS. MARLATT: I'm sorry, I misspoke  
18 myself.

19 Q. What I was referring to were tables  
20 4 -- actually starting at table 2, which we already  
21 referred to, which is the effects of nuclear station  
22 construction, table 3 is summary of environmental  
23 effects during station operation, table 4 potential  
24 non-radiological effects of decommissioning. Those are  
25 all the tables I have.

1 MR. JOHANSEN: A. Yes, I agree.

2 Q. Table 1 is specific to mining,  
3 milling and processing?

4 A. Yes.

5 [4:00 p.m.]

6 Just one observation, I flipped forward  
7 and saw the title page to appendix 1, which is in the  
8 front of all of these tables, I think that removes any  
9 doubt about what appendix 1 is. Also it indicates in  
10 the title that these effects or measures are typical.  
11 The title of appendix 1 implies that this is not an  
12 exhaustive listing, but a good sample, if you will, to  
13 illustrate the kinds of impacts that might result in a  
14 project-specific case.

15 Q. Mr. Johansen, I really hate to go  
16 over this again, but table 1, I do not see any  
17 representative samplings of impacts listed there.

18 A. No. I said measures.

19 Q. All right, measures. Thank you.

20 I would like to now move into the  
21 economics area which I have managed to break down into  
22 one question, moving along here.

23 Page 159, Interrogatory 10.11.1.

24 THE REGISTRAR: .159.

25 ---EXHIBIT NO. 520.159: Interrogatory No. 10.11.1.

1 MS. MARLATT: Q. I should note that I  
2 include this interrogatory because it was referred to  
3 in a Panel 9 interrogatory.

4 And attached to that interrogatory we  
5 received the economic impact assessment of the  
6 demand/supply plans, which is on page 160 of our  
7 materials. Mr. Penn, I will direct this question at  
8 you.

9 In reviewing this report, Mr. Penn, would  
10 you agree with me that the purpose of this report was  
11 to look the provincial impacts of the demand/supply  
12 plans?

13 MR. PENN: A. I believe so, yes.

14 Q. Thank you.

15 A. Although it gives gross domestic  
16 product. I'm not sure. I haven't studied this  
17 sufficiently to know whether that means gross  
18 provincial product.

19 Q. All right. Well, I guess more  
20 specifically than that, looking at the table of  
21 contents on 161, and having reviewed the report, would  
22 you agree with me that regional economies within  
23 Ontario are not discuss in this report? That's not the  
24 purpose of this report?

25 A. No, I think it is talking about the

1 effect on the province as a whole and Canada as a  
2 whole.

3 Q. Thank you, Mr. Penn.

4 Moving into the area of the North  
5 Channel, or I should say back into the area of the  
6 North Channel.

7 I would like to explore with the panel  
8 some of the impacts of the existing nuclear fuel cycles  
9 on the North Shore as of today.

10 Mr. Johansen, since we started off in  
11 this area sometime ago, would you agree with me that  
12 have radiation exposure to the public Ontario North  
13 Shore resulting from uranium mining, milling and  
14 refining is not assessed in this environmental  
15 assessment?

16 MR. JOHANSEN: A. Not in detail.

17 In this environmental assessment, where  
18 are we in the materials?

19 Q. There is not a page specifically  
20 referring to this because there isn't anything  
21 specifically referring to this that I can find. But we  
22 are in the area of...

23 THE CHAIRMAN: We are having a little  
24 discussion here about what the question is. Are you  
25 suggesting to the panel there is no environmental

1 assessment by Ontario Hydro of the environmental  
2 effects of mining uranium, is that the question?

3 MS. MARLATT: Yes.

4 MS. PATTERSON: Or was it specific to the  
5 North Shore?

6 MS. MARLATT: Sorry, I meant that, as  
7 part of that first question.

8 THE CHAIRMAN: But forget about the North  
9 Shore, it's anywhere; is that right?

10 MS. MARLATT: No, actually I did mean it  
11 in the context of the North Shore.

12 THE CHAIRMAN: Well, if it's in the  
13 context of the North Shore, that treads on site  
14 specific considerations. Your question in a general in  
15 term doesn't.

16 Anyway, there isn't such a thing; is that  
17 correct, or is there?

18 MR. JOHANSEN: Only in very general terms  
19 is that included in appendix 4 of the environmental  
20 analysis and I suppose summarized in the DSP report,  
21 appendix 3 -- Exhibit 3. It's getting late in the day,  
22 I guess.

23 Exhibit 507, our nuclear materials  
24 document, does address the impacts in a general way, I  
25 admit, of the front end fuel cycle and relies largely,



1 as we have explained it in previous testimony, on  
2 investigations by others. We have simply taken the  
3 findings of these other investigations that we have  
4 selected and married their unit impact or unit risk  
5 results with Ontario Hydro's material flows, and on  
6 that basis estimated some impacts on risks on a unit  
7 energy basis, gigawatt/annum basis.

8 So we have attempted to address at least  
9 the environmental and health effects of the front end  
10 of the fuel cycle, but not in a very specific North  
11 Shore context.

12 Q. All right. To focus the discussion,  
13 and to explain that the question is not intended to be  
14 site-specific; it's actually intended to address the  
15 criteria of distribution of risks and benefits, with  
16 particular emphasis on the nuclear fuel cycle.

17 I would also to look back at page 191,  
18 and, Mr. Johansen, as you know, we went over this map  
19 at beginning of the cross-examination, and I noted the  
20 location of Elliot Lake, the mining and milling. I  
21 think noted the location of CAMECO uranium refinery  
22 which is just south of the Mississagi First Nation  
23 which is marked with an X.

24 A. Yes, you did.

25 Q. And I don't think I noted yet the

1 location of the Cutler Asset.

2 A. I think you referred to it.

3 Q. Yes. Which was located just to the  
4 east of Serpent River, and you see there is a cross  
5 there just beside location?

6 A. Yes.

7 Q. Okay. Now, just from the aspect of  
8 the nuclear fuel cycle, the front end part of the  
9 nuclear fuel cycle, would you agree with me, Mr.  
10 Johansen, that there is a concentration of activities  
11 in this area?

12 A. Well, yes, I certainly wouldn't  
13 dispute that. On the other hand, I have to point out  
14 again that Ontario Hydro is not by any means the only  
15 purchaser of uranium and refining products, mining and  
16 refining products. In fact, we are only about 10 per  
17 cent of the total business up there.

18 Q. Mr. Johansen, just to concentrate or  
19 to specify what these questions are with regard to.  
20 It's not about Ontario Hydro's distribution of what  
21 it's using up there, that is a separate issue. What I  
22 am talking about is what is the existing environment on  
23 the North Channel as a result of all the nuclear fuel  
24 activities right now, today, and in the very near past,  
25 on the North Channel. That's it. So let's work within

1 that framework.

2 Mr. Johansen, do you think it would be  
3 fair to say that or accurate to say that most of the  
4 air emissions that are of concern from nuclear fuel  
5 activities results particularly from milling and  
6 refining operations, I am thinking of uranium dust.

7 THE CHAIRMAN: It's probably fair to talk  
8 about mining activities rather than nuclear fuel  
9 activities.

10 Mining activities would include the  
11 production of raw material for nuclear fuel.

12 MS. MARLATT: Q. I am thinking of  
13 milling and refining activities, is that fair to say  
14 about air emissions?

15 MR. JOHANSEN: A. In general I would  
16 tend to agree, although I may stand to be corrected on  
17 that, because it really would depend on the extent to  
18 which emissions from the mines and from the milling  
19 operations are controlled, they are all regulated. And  
20 I could agree with you if all of these activities were  
21 unabated or uncontrolled, there would tend to be, I  
22 would think, more dust generated during the milling  
23 process at surface. But that doesn't necessarily  
24 equate to more emissions to the environment.

25 Q. And Ontario Hydro doesn't regulate

1 the air emissions from mining, milling -- specifically  
2 milling or refining operations; correct?

3 A. No, we don't.

4 Q. Thank you. Mr. Johansen, are you  
5 aware that on May 16th and 17th of 1990, the CAMECO  
6 refinery released 178 kilograms of uranium during a  
7 26-hour period? Were you aware of that incident?

8 A. I was generally aware that there was  
9 some sort of incident up there. I am not familiar with  
10 the details.

11 Q. Okay. Does your knowledge include  
12 the fact that AECB suspended CAMECO's licence for a  
13 week after this emission?

14 A. I believe I heard something like  
15 that, but I have never seen any official documentation.  
16 I don't dispute that it might have happened, but I am  
17 not the expert on that.

18 Q. Is there anyone who is...

19 No, all right.

20 Looking at map on page 191, would you  
21 agree with me - and you can't quite tell from the map,  
22 but would you have any reason to disagree with me that  
23 the Mississagi First Nation is the closest residence to  
24 the CAMECO uranium refinery? Do you know that?

25 A. Well, I don't know for a fact, but I

1 don't have any reason to disbelieve the map that you  
2 have produced here.

3 Q. Mr. Johansen, were you aware that on  
4 January 25th, 1990, 170 kilograms of NOx was emitted  
5 into the environment from CAMECO? Were you aware of  
6 that incident? NOx?

7 A. NOx, no, I don't think so.

8 Q. So you weren't aware that one  
9 operator had to be hospitalized as a result of that  
10 incident?

11 A. No, I don't know anything about that.

12 Q. Moving on to page 211, it has  
13 previously been marked as Exhibit 645, Final Report,  
14 Mining, Milling and Refining of Uranium in Ontario,  
15 Select Committee on Ontario Hydro Affairs, December  
16 1980. I know that you have already been questioned  
17 about this report by Northwatch, but my questions will  
18 be in a slightly different area.

19 Just to give us some background to the  
20 questions, looking at page 213, the third sentence  
21 there starts:

22 Operations 20 or 25 years ago severely  
23 polluted substantial bodies of water in  
24 the Serpent River watershed. Hundreds of  
25 thousands of tonnes of a slightly

1 radioactive acid generating fine gravel,  
2 the waste from the uranium mills, has  
3 been and continues to be dumped into  
4 natural valleys that once contained fresh  
5 water lakes and ponds. Hundreds of  
6 thousands of gallons of pure fresh water  
7 are diverted from the nearby rivers for  
8 use in the mines to control dust and the  
9 mills as in integral part of the uranium  
10 extraction process.

11 Mr. Johansen, were you aware that the  
12 Serpent River is the north and west boundary of the  
13 Serpent River First Nation?

14 A. No, I wasn't aware that it was a  
15 boundary, but I certainly am aware of generally where  
16 the Serpent River is and that there were native areas  
17 in that vicinity.

18 Q. All right. Native areas in that  
19 vicinity. To be more precise, Mr. Johansen, I asked  
20 you to look at the map on page 191. In fact, Serpent  
21 River Reserve is located right at the mouth of the  
22 Mississagi River; correct? Do you see that on that  
23 map?

24 A. I take your word for that. This map  
25 is not very detailed. I have no reason to disbelieve



1       you.

2                   Q. All right. Looking at page 216, the  
3 second paragraph starts, and this a list, I should say,  
4 a list of recommendations that came out of the Select  
5 Committee Report.

6                   The Serpent River Indian must gain  
7 some redress for the problems that have  
8 been created by the operation of uranium  
9 mines on the Serpent River watershed. As  
10 the Band explained to the Committee, the  
11 early operation of the mines during 50s  
12 saw highly acidic effluent dumped into  
13 the Rivers. The Band believed that this  
14 destroyed the fishing and trapping base  
15 of its economic life. The Band has never  
16 received any compensation for this.  
17 If you see just below that recommendation  
18 20.

19                   The federal authority should resolve  
20 the concerns of the Serpent River Indian  
21 Band with all possible haste.

22                   Were you aware, Mr. Johansen, that the  
23 Serpent River First Nation has never received any  
24 compensation for the environmental damage and the  
25 impacts on the their way of life as a result of the

1 operations of the mines?

2 A. No, I know nothing about it.

3 Q. All right. In the first paragraph  
4 that we were just referring to, the second part of the  
5 paragraph starts:

6 Apparently as a partial recompense an  
7 acid plant was built by Canadian  
8 Industries Limited on reserve land to  
9 supply the mills at Elliot Lake.  
10 Rent-free use of reserve land would have  
11 given the Band some financial interest in  
12 the Elliot Lake development. However,  
13 the operation as closed 1963 leaving  
14 after dirty plant and piles of  
15 acid-generating material trucked in from  
16 other areas on the site. Apparently the  
17 lease negotiated for the Band by the  
18 Department of Indian Affairs and Northern  
19 Development contain no provisions for  
20 cleaning up the site.

21 Were you aware of this situation with  
22 regards to Cutler Asset Company, Mr. Johansen?

23 A. No, I wasn't.

24 Q. Are you aware that Serpent River  
25 First Nation still cannot use the Serpent River for

1 drinking water?

2 A. No.

3 Q. Are you aware that fishing is still  
4 limited in the Serpent River and that the Pickerel,  
5 which the First Nations in the area fish extensively,  
6 has not recovered from this contamination?

7 A. No, I don't know that specific  
8 information.

9 Q. Were you aware that the non-native  
10 community of Serpent River received a water  
11 purification system, but that the Serpent First Nation  
12 did not?

13 A. No. This whole area, I might save  
14 some time here, is not an area that I am personally,  
15 intimately familiar with. I recall at the time that  
16 this 1980 Select Committee Report was issued, reviewing  
17 these recommendations, but I haven't personally tried  
18 to track what happened with these recommendations.

19 Q. Looking at page 221, Mr. Johansen.  
20 This is a transcript excerpt, Volume 137, page 24056,  
21 and I would ask you to look at lines 12 to 18. I think  
22 you were discussing the involvement of Ontario Hydro in  
23 decommissioning waste. Is it asked, among other  
24 things, about whether the cost of uranium included some  
25 provision for decommissioning of these wastes, and our

1 response indicated that Ontario Hydro had no financial  
2 involvement in the decommissioning of these wastes  
3 except in the case of Stanleigh mine which was  
4 dedicated to Ontario Hydro supply.

5 Mr. Johansen, would you agree with me  
6 that the adequacy of the decommissioning at other  
7 Elliot Lake mines affects the natural environment in  
8 that area?

9 A. Well, I could agree in general, not  
10 from specific knowledge. But clearly if a  
11 decommissioning plan is not implemented effectively,  
12 then it follows that there may be impacts in the long  
13 run from that.

14 Q. All right. Mr. Johansen, would you  
15 agree with me, just if the materials that we have gone  
16 over at the present, that the North Shore has a  
17 concentration of front-end activities as part of the  
18 fuel cycle?

19 A. Well, it certainly has uranium mining  
20 activities.

21 Q. And milling?

22 A. And milling.

23 Q. And refining?

24 A. And refining.

25 What other activities are up there I am

1 not so familiar with. So I guess I would hesitate to  
2 give a categorical assessment that that is a  
3 concentration. But it seems reasonable to me. It's  
4 generally known as a mining area.

5 Q. All right. And you aware from  
6 previous discussions you have had with other counsel  
7 here that Northern Ontario, in fact as you said, all of  
8 Ontario is being looked at as a potential siting area  
9 for a high level nuclear fuel site; correct? Nuclear  
10 fuel disposal site?

11 A. The Canadian Shield part of Ontario,  
12 yes.

13 Q. Okay. Mr. Johansen, in your  
14 testimony as part this panel, you haven't testified  
15 about any siting considerations for nuclear facilities;  
16 that's correct?

17 A. That's correct, and that's very  
18 deliberate.

19 Q. And you haven't testified about any  
20 siting considerations for candidate sites or site  
21 categories?

22 A. That's correct, and again  
23 deliberately.

24 Q. Have you reviewed the evidence from  
25 Panel 6 with regard to exclusionary criteria for

1       hydraulic facilities?

2                   A. I read the transcripts of the direct  
3 evidence. All I can say is that there is a difference  
4 between the Panel 6 purpose and the Panel 9 purpose.

5                   Q. Would you agree with me, then, that  
6 you did not provide any evidence at this hearing about  
7 whether there are any areas of Ontario that would be  
8 unacceptable for a nuclear facility?

9       [4:23 p.m.]

10                  A. No. As I said, I quite deliberately  
11 excluded evidence on sighting as Ontario Hydro is not  
12 proposing or seeking approval for any new nuclear  
13 projects at this time.

14                  Q. So you would agree that you have not  
15 identified any areas of the province that would have to  
16 be excluded based on existing environmental conditions?

17                  A. That's correct.

18                  Q. Yes.

19                  A. I've not attempted to do that.

20                  MS. MARLATT: Thank you. Those are all  
21 my questions.

22                  THE CHAIRMAN: Thank you, Ms. Marlatt.

23                  Mrs. Mackesy, are you next?

24                  MRS. MACKESY: Yes, I am. Can I have a  
25 few minutes to bring up my materials.



1 THE CHAIRMAN: Do you want to start  
2 tonight?

3 MRS. MACKESY: I'm in your hands, Mr.  
4 Chairman.

5 THE CHAIRMAN: Well, if you want to start  
6 we can take half an hour and then we will stop at five  
7 o'clock.

8 MRS. MACKESY: That will be fine, as long  
9 as I can get my materials.

10 THE CHAIRMAN: Yes, certainly.

11 ---Off the record

12 DR. WHILLANS: Mr. Chairman, can I take  
13 the opportunity to add some information that was  
14 requested by Mr. Campbell.

15 THE CHAIRMAN: Yes.

16 DR. WHILLANS: I hesitate to do it when  
17 he's not here, but we'll make sure the information gets  
18 to him.

19 THE CHAIRMAN: Yes.

20 DR. WHILLANS: He had asked me, actually  
21 on two occasions, about the derivation of a dose  
22 reduction effectiveness factor specifically referred to  
23 in the paper by Preston and Pierce, and he referred to  
24 a table, but I said I couldn't tell him where the  
25 numbers came from.

1 Over the lunch hour I was looking at the  
2 paper and I see on a previous page the information  
3 which I think he was seeking, and that is on page 34 of  
4 Exhibit 661, which is the Preston Pierce paper, the  
5 first full paragraph begins:

6 "Finally, although the primary  
7 purpose here is comparison of  
8 dosimetries, it will make the results  
9 here much more concrete if some  
10 discussion is given of how they might  
11 relate to lifetime risks from exposure to  
12 low doses of low LET radiation."  
13 And then at the bottom of that paragraph  
14 it says:

15 "Regarding point (ii)...", which is  
16 this point:

17 "...it is suggested in a recent  
18 UNSCEAR report 18 (Annex B, paragraph  
19 153) that linear extrapolation in this  
20 setting will overestimate low-dose risks  
21 by a factor of 1.5 to 3.0."

22 And so on page 35 which was his table,  
23 the last paragraph says:

24 "Allowance for the possible  
25 overestimation of risk by linear

1 extrapolation to low doses will be made  
2 by dividing by the limits 1.5 to 3 cited  
3 above. Some results, in units of death  
4 per 10,000 persons at an exposure of  
5 10 mSv are:....", and then there is this  
6 table.

7 And the numbers which I couldn't explain  
8 for him are simply the linear estimate divided by  
9 either 1.5 or 3. So I think that is the answer he was  
10 seeking.

11 And I just comment that the UNSCEAR  
12 report which is referred to in this document is the  
13 1986 UNSCEAR report, which I hate to reference because  
14 I don't think it's an exhibit, but I do because Dr.  
15 Connell was asking questions about the dose response  
16 relationships for radiation induced cancer.

17 In that document it has a very  
18 substantial annex B which goes through the evidence,  
19 both human and animal in many -- not in many species,  
20 but in many end points, for many end points and comes  
21 up with the factor 1.5 to 3 that is referenced in this  
22 document. It also suggests the range 2 to 10 which I  
23 referred to earlier.

24 Thank you.

25 THE CHAIRMAN: All right, thank you.

1 Mrs. Mackesy.

2 MRS. MACKESY: Thank you. I prepared two  
3 packages of materials for cross-examination. I've  
4 given copies for the Board to the clerk and there are  
5 extra copies on the table at the front of the room.

6 CROSS-EXAMINATION BY MRS. MACKESY:

7 Q. I would like to begin by asking some  
8 questions on the performance of nuclear generating  
9 stations.

10 The first question has to do with the  
11 megawatt capacity of the Bruce nuclear power  
12 development, so I suppose that would be for Mr. Daly.

13 I'm going to refer to the information in  
14 three different sources and then ask for an explanation  
15 of the differences in the figures.

16 So would you first please turn to  
17 Interrogatory 9.29.1 which is in the first package of  
18 cross-examination materials.

19 MRS. MACKESY: And I'll need a number for  
20 that please, 9.29.1.

21 THE REGISTRAR: That will be .160.

22 MRS. MACKESY: Thank you.

23 ---EXHIBIT NO. 520.160: Interrogatory No. 9.29.1.

24 MRS. MACKESY: And this interrogatory  
25 comprises the entire first package.

1 Q. Now, in this interrogatory I asked  
2 about Ontario Hydro information leaflets on nuclear  
3 facilities, and Ontario Hydro attached a number of  
4 brochures to the response.

5 Would you please turn to page 3. This is  
6 the brochure on the Bruce nuclear power development,  
7 and on page 3, the first full paragraph in the first  
8 column, starting about five lines down, reads:

9 The generating stations are capable  
10 of producing more than 6,900 megawatts of  
11 electricity, enough to meet the heaviest  
12 demands of Metropolitan Toronto, Ottawa,  
13 Kingston, Hamilton, London and Thunder  
14 Bay.

15 And farther down in the column under the  
16 heading Bruce A, going to the second paragraph, the  
17 Bruce A reactors are described as being 825 megawatts  
18 each in size.

19 Going to the middle column under Bruce B,  
20 the size of Bruce B reactors are described as being 915  
21 megawatts each.

22 Now, based on those figures, would you  
23 agree that the Bruce A and B reactors could produce  
24 6,960 megawatts which would substantiate the earlier  
25 figure of over 6,900 megawatts?

1 MR. DALY: A. So you are taking four  
2 times 825?

3 Q. That's correct.

4 A. And four times 915?

5 Q. That's correct.

6 A. Yes. Subject to check, yes.

7 Q. And now would you please turn to  
8 Exhibit 519, the Ontario Hydro overheads and page 9,  
9 please.

10 And there the Bruce A reactors are  
11 described as having a rating of 600 -- I'm sorry, 769  
12 megawatts not including steam capacity. All four Bruce  
13 B units are listed as having 860 megawatt capacity.

14 And would you agree, given those numbers,  
15 that the total production capacity for the eight units  
16 would be a little over 6,400 megawatts?

17 A. Yes. The difference in the numbers  
18 is that these numbers on page 9 are the net numbers.  
19 The numbers you read in earlier, the 825 for Bruce A  
20 and 915 for Bruce B, are gross numbers. So that's the  
21 difference between the gross and net is the electricity  
22 that's used within the site.

23 Q. So the net figure is what goes out  
24 over the transmission lines?

25 A. The net figure is what's exported.



1 Q. Outside the boundaries of the  
2 development?

3 A. Outside the boundaries of the  
4 development, yes.

5 Q. Okay. And the third set of figures  
6 are once again in 9.29.1, that is Exhibit 520.160, and  
7 for these figures would you turn to pages 10 and 12,  
8 please.

9 Page 10 is a generating station data  
10 sheet for Bruce "A" and there the reactors are rated at  
11 net electrical of 740 megawatts while on page 12  
12 there's a comparable for Bruce "B" and the reactors are  
13 rated at net electrical of 750 megawatts each.

14 Now, the total I get for that output is  
15 5,960 megawatts; is that correct?

16 A. Yes, I accept your calculation.  
17 These figures are slightly out of date. I think what  
18 they reflect is that both plants have been operated  
19 over the years where the stations found that they could  
20 produce more power than the original design, so the  
21 most up-to-date, net figures are the figures I gave in  
22 my direct evidence.

23 Q. Thank you. Has the Pickering output  
24 been changed by any similar sort of magnitude?

25 A. Not similar. Pickering "A" was

1 operated from 540 to 542, a small change, and Pickering  
2 "B" has not been operated.

3 Q. Why is there a difference in the way  
4 the two stations have been handled?

5 A. Well, it goes back to the original  
6 design. Bruce "A" was designed to supply heavy  
7 water -- supply steam to the heavy water plant, so it  
8 was rather unique in that aspect, and we found over a  
9 period of years that there was the facility to upgrade  
10 the plant, I guess it was a slightly later unit also  
11 than Pickering A.

12 Pickering "B" may be operated in the  
13 future, there is potential at Pickering "B" to operate  
14 by 10 to 15 megawatts and that is one possibility  
15 that's being considered for the future, but there's no  
16 firm plans to do it at the moment.

17 Q. And what about Bruce "B", if it's  
18 increased --

19 A. Bruce "B" has been increased in power  
20 and it's operated to 915 on a regular basis and on an  
21 occasional basis in winter it can reach 940 under  
22 conditions where the lake water temperatures are  
23 ideal.

24 But I think the Bruce reactors have  
25 pretty well reached their likely highest level of

1 power.

2 Q. When Bruce "B" is at 940, what would  
3 the net be from that then?

4 A. The net would be about 55 megawatts  
5 less than that.

6 Q. Now, it's been mentioned that the  
7 annual Bruce "A" capability factors dropped in the late  
8 1980s. Were some of the problems at Bruce "A" caused  
9 by running the reactors too hard in order to increase  
10 the amount of electricity produced?

11 A. Certainly not the primary reason.  
12 It's a question we have asked ourselves as to whether  
13 there was some contribution and, to date, we have no  
14 firm conclusion that it has definitely contributed.

15 When you run at higher powers your  
16 operating margins are slightly reduced. So we have  
17 looked to see whether there was any impact of those  
18 reduced operating margins, for example, in increased  
19 number of trips or shutdowns, and there certainly  
20 doesn't appear to be any significant impact.

21 You know, we continue to look at that to  
22 see whether the current operating conditions are ideal.  
23 The plant in fact, as you indicated, it has been  
24 periodically derated. That was largely due to deposit  
25 build up in the steam generators which would start

1 about the mid-80s. So at least initially that doesn't  
2 appear to have been related to operating.

3 So I guess my bottom line answer in that  
4 is, whereas it may have some effect, we don't think  
5 it's been a significant contributor.

6 Q. You use the term operating margins in  
7 your answer.

8 A. Yes.

9 Q. Could you explain what you mean by  
10 that?

11 A. Well, there's a large number of flux  
12 detectors positioned around the reactor, some for  
13 safety purposes and some for regulating purposes to  
14 control the reactor and they have set points that are  
15 appropriate for safety purposes or regulating purposes.

16 And, for example, during the conditions  
17 before we operated, you know, a typical margin between  
18 the operating point and the control point might have  
19 been, for example, 15 per cent; and in operating by  
20 five per cent that margin is reduced to 10 per cent.  
21 So that gives the operator a little bit less room to  
22 manoeuvre.

23 Q. Now, in response to an interrogatory  
24 for Panel 2 I was given the 1990 figure for the total  
25 net generation from Bruce "A" and Bruce "B" in

1 gigawatthours. Would you be able to give me a  
2 comparable figure for 1991, if not tonight, perhaps by  
3 Monday morning?

4 A. This was in gigawatthours?

5 Q. Yes.

6 A. No, I couldn't give you it in  
7 gigawatthours. I could give you the capability factor  
8 however, which--

9 Q. I'd prefer --

10 A. --if you would prefer it, in  
11 gigawatthours.

12 Q. Is there some way you work out the  
13 net generation from that?

14 A. Yes, I would have to calculate it.

15 Q. Could you?

16 A. I could easily do that tomorrow  
17 morning. I don't have that.

18 Q. That would be fine. Monday morning  
19 would be fine.

20 A. Yes.

21 Q. Now, would you please turn to page 63  
22 of Exhibit 519, this is the retubing schedule. Has the  
23 retubing work on Pickering B and Bruce "B" been  
24 financially committed?

25 MR. PENN: A. No.

1 Q. It hasn't. Okay. When would you  
2 anticipate doing that?

3 A. Well, we just committed work for  
4 retubing Bruce 1 and 2.

5 Q. Yes.

6 A. We haven't yet committed for retubing  
7 Bruce 3 and 4.

8 And Pickering 5, which is the first unit  
9 of Pickering "B", is not due to start retubing until  
10 2009, so I would guess that we would go to our Board of  
11 Directors for approval to proceed and gain commitment  
12 of the money probably in about 2006 so that we have  
13 time to put the infrastructure in place, maybe 2007,  
14 but that sort of period. And for Bruce "B", it would  
15 be similarly round about 2009.

16 Q. Now, you mentioned that you haven't  
17 committed it yet for Bruce 3 and 4. About what time --

18 A. Well, again, Bruce 3 and 4 are not  
19 due to be retubed because they are a different design  
20 from Bruce 1 and 2 channels, until 2003. So I would  
21 think we would seek approval to proceed round about  
22 2000.

23 Q. Now, with those dates being some  
24 distance in the future, is there a possibility that  
25 something might happen in the meantime and you would



1 decide not to?

2 A. Well, the thing that could happen,  
3 Mrs. Mackesy, is that other large maintenance events  
4 may come along where it would be to the advantage of  
5 the consumer of electricity in the province if we  
6 combined schedules.

7 So it's possible that retubing on a unit  
8 might be advanced by a year or so, or it may be delayed  
9 by a year or so. It would depend, of course, if there  
10 was a delay on the state of the pressure tubes at that  
11 particular time.

12 So I made these comments because we  
13 review these dates every year and there is changes in  
14 them and the changes are made in order to ensure that  
15 there is a smooth projection of capability, capacity  
16 factor that Mr. Daly spoke to, and to ensure that  
17 there's minimum impact on the electricity rates.

18 [4:45 p.m.]

19 Q. I wasn't thinking so much of advances  
20 and delays in the schedules as the cancellation of...

21 A. No, I don't think that these will be  
22 cancelled. There are sound reasons why in the case of  
23 Bruce 1 and 2, which only have two garter springs in  
24 the channels, and inevitably even if we could move them  
25 to separate the pressure in calandria tubes, that they

1 would then droop and eventually contact again.

2 And Bruce 3 has some limitations on its  
3 allowance for longitudinal growth, so it needs to be  
4 retubed around about year 25.

5 The others I am confident that we will  
6 get up to 30 years. And as you see in this table, they  
7 have varying lives from 26 years up to 30 years, and  
8 the reason for that is that we found from experience  
9 that it is not effective to try and retube two reactors  
10 at one site at one and the same time. It results in  
11 costing more money and taking more people, and so we  
12 spread them out.

13 Now, it may be, as time goes on and we  
14 learn more about this, that it won't be necessary to  
15 retube these units at year 30, that their life could be  
16 extended, but we are not at that position at the  
17 moment.

18 Q. Okay. If a station is retubed  
19 between 10 and 20 years of age, as is happening in the  
20 case of Pickering "A", is it less likely to be a  
21 candidate for life extension than a station that is  
22 retubed between 20 and 35 years of age or later?

23 What I am getting at is that in the first  
24 case where the retubing is done between 10 and 20 years  
25 of age, the replacement tubes might be wearing out just

1 about the time that the station reaches its 40-year  
2 lifetime age, and that might make it look questionable  
3 for life extension, whereas when the retubing, if the  
4 retubing were done later in the life of a plant, then  
5 replacement tubes might be considered in good enough  
6 condition to keep the plant, the whole plant operating  
7 somewhat beyond the 40-year lifetime.

8 A. Well, you are quite right, that is a  
9 consideration.

10 In the case of Pickering "A", when it's  
11 40 years old, the replaced pressure tubes will be  
12 typically about between 25 and 27 years old.

13 So forgetting the possible optimism of  
14 extending the life beyond 30 years, then this would be  
15 an issue to analyze from a point of view of the  
16 financial appropriateness of extending that life. If  
17 replacement power is cheaper, then the decision would  
18 be to shut down the reactor.

19 Q. My next question is on the load  
20 following ability of nuclear units, and the  
21 interrogatory I am going to be using at is page 21 of  
22 my second package of materials. Its number is 9.29.21.  
23 I would need an exhibit number, please.

24 THE REGISTRAR: .161.

25 ---EXHIBIT NO. 520.161: Interrogatory No. 9.29.21.

1 MRS. MACKESY: Thank you.

2 Q. My question there was:

3 What is the load following ability of  
4 each of the units at Bruce, Pickering and  
5 Darlington?

6 And Ontario Hydro's response reads:

7 Ontario Hydro's CANDU reactors are  
8 designed primarily for base-load  
9 application, but have some load  
10 manoeuvring capability. Restrictions on  
11 load manoeuvring capability are based on  
12 safety considerations related to fuel  
13 stress. Units in Bruce "A", Darlington  
14 and Pickering "B" stations are capable  
15 manoeuvring between 100 per cent and  
16 60-65 per cent of full power on a daily  
17 basis with a power ramp rate usually  
18 restricted to less than 1 per cent per  
19 minute. The Pickering "A" and Bruce "A"  
20 stations have more limited load  
21 manoeuvring capability, but are not  
22 generally used for this purpose.

23 In the second sentence there is mention  
24 made of safety considerations related to fuel stress.  
25 Could you explain what that means, please?

1 MR. DALY: A. I think what is generally  
2 referred to here is that if you were to increase or  
3 decrease power too fast, then you could get an  
4 interaction between the fuel cladding and the fuel  
5 inside the cladding which could potentially lead to a  
6 fuel defect. Tests done many years ago established  
7 what were appropriate rates of power that would prevent  
8 any fuel defects. That's really what is behind that.

9 MR. PENN: A. I could add something. I  
10 was asked what I felt was an appropriate use for  
11 regression analysis earlier in the hearing and I talked  
12 about the fact that you could use various functions.  
13 And when we had fuel failures at Pickering "A" in the  
14 early 70s, we had it because we changed power through a  
15 step change that was too large. And we produced a  
16 great deal of data where you could use regression  
17 analysis within the field to find the functional  
18 relationship between the power change and the maximum  
19 power and the burn up that the fuel was at. This is  
20 what this refers to, that there is a fuel defect  
21 criteria that's well established which sets limits on  
22 this matter.

23 MRS. MACKESY: Those are my questions on  
24 nuclear performance.

25 I am going to be moving to a new area,



1 Mr. Chairman, this might be a good time to break.

2 THE CHAIRMAN: That will be fine.

3 I have just been reminded, we are not  
4 sitting tomorrow. We will be reconvening again Monday,  
5 next week.

6 On the Thursday, the 14th, time has been  
7 allotted for discussion of intervenor programming and  
8 procedural matters of one kind or another.

9 There is some material, written material  
10 that's been furnished by some parties which will be  
11 available. I think there is a letter going to the  
12 parties going about that. Perhaps if it's not already  
13 gone, it will be going in the next short while, and  
14 packages will be available here for those that can pick  
15 them up.

16 If there is nothing else to do, we will  
17 now adjourn until ten o'clock on Monday morning.

18 THE REGISTRAR: This hearing will adjourn  
19 until ten o'clock Monday, May the 11th.

20 ---Whereupon the hearing was adjourned at 4:55 p.m., to  
21 be reconvened on Monday, May 11, 1992, at  
10:00 a.m.

22  
23  
24  
25 JAS/BD [c. copyright 1985]







